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XXXV.

MY LATEST IMPROVEMENTS IN THE RADICAL TREATMENT OF CHRONIC SUPPURATIONS OF THE ACCESSORY CAVITIES OF THE NOSE.

By Dr. Luc,

PARIS.

Gentlemen:—While accepting your amiable invitation to join this meeting of my American colleagues I could not forget the kind appreciation which my personal contribution to the radical treatment of the chronic suppurations of the accessory cavities of the nose found in your country, and I came to the conclusion that I could not better interest you than by submitting to you the result of my recent attempts and investigations in this special department of nasal pathology.

In this analysis of the modifications and improvements which I have been gradually induced to bring into my first methods I will successively consider the chronic suppuration of:

A. The maxillary sinus;
B. The frontal sinus;
C. The ethmoidal cells;
D. The sphenoidal cavity.

A.

At the outset of this first chapter allow me to say that I completely share the views expressed on the same subject by my colleague and friend Lermoyez in several of his publications:

1. That the surgical treatment is to be strictly limited to the chronic forms of the diseases.

2. That, as regards these chronic forms, a distinction is to be admitted between the properly called suppurative sinusitis caused and kept up by a primitive infection of the mucous membrane of the antrum, soon ending in a fungous degeneration of its tissue, and the maxillary empyema in which the pus did not originate in this cavity, but simply accumulated in it, its source being either a frontal or a dental abscess. In the latter case the sinusal mucous membrane may remain in contact with the pus, without becoming infected and undergoing the above mentioned degeneration, and a simple washing of the cavity, after previous suppuression of the source of the pus, may suffice to obtain a definitive cure.

Lermoyez's conclusion to which I was brought by my own experience is that it is not advisable to adopt the radical operation in any case of chronic abscess of the antrum without having previously attempted to cure it by one or rather several washings of the diseased cavity, after a puncture has been made in the inferior meatus.

Entering the subject of the radical cure of chronic maxillary suppuration, for which I proposed seven years ago a new operative method which has since then been successfully performed in nearly all countries, allow me to tell you that it bears the name of your countryman Caldwell, associated with mine. I have always been ready to acknowledge his priority, as regards the paternity of the concerned operation, but I was able to prove on many occasions that I had in-

vented my own proceeding in complete ignorance of the article in which Caldwell had described his method. Allow me to add that this article had passed nearly unnoticed in your country and that it was only brought to my knowledge, a whole year after the publication of my own description.

It is not my intention to renew this description here. I will only call your attention to a few technical details which were suggested to me by the experience acquired after operating on about a hundred cases.

My double aim, while performing the operation in question, is to make two large bony resections: the one at the expense of the anterior wall of the sinus, in order to obtain a wide but transitory communication between the sinus and the mouth, and to remove thoroughly the pus and the diseased mucous membrane, the other at the expense of the internal or nasal wall of the sinus, in order to create a wide and permanent communication between the antrum and the nasal fossa. This latter resection, which requires simultaneous ablation of the greatest part of the middle and inferior turbinals, is greatly facilitated by the introduction of the little finger into the nostril, which enables the surgeon to avoid any lesion of the septum and to ascertain that the free communication desirable has been obtained and that no fragment of the turbinal mucosa, likely to be in the way of the further drainage, has escaped the cutting forceps.

I cannot too much emphasize the fact that the antro-nasal communication must be a large and permanent one, whereas the antro-buccal one is only to last just as long as is necessary for the cleaning and curetting of the sinusal cavity. This operation has become such a current one in my practice that, for more than three years, I have left off keeping a regular statistical account of my operated cases, and I feel bound to say that, since I adopted the principle of substituting for the small artificial hiatus made on my first operated patients a large resection of the greatest part of the internal wall of the sinus, I have met no instance of any case, however chronic it may have been, that did not radically heal within a lapse of 4 or 6 weeks.

It was a great satisfaction for me to find my own results n accordance with the brilliant statistics presented last year

by my friend Lermoyez at the congress of Manchester.

I call your attention to the fact that the principle of this operation, which gave us such rapid, radical, and let me say, unheard of results, is based on a scrupulous regard for the laws of Nature, according to which the sinusal cavities are to communicate with the nose, but not with the mouth. My aim was then simply to substitute for the natural hiatus so unfavorably situated and so insufficien as regards its size, a considerable opening not amounting less than the third part of the wall at whose expense it is made, thus making of the maxillary a sort of lateral prolongation of the corresponding nasal fossa, likely to get cleaned as well as the latter, when the patient is blowing his nose. Not only were the results of his operation and satisfactory, but I dare say they were somewhat unexpected and caused some surprise especially in Germany, where the radical cure of suppurating cavities was based on the principles (suppression of the cavity or the epidermisation of its wall by means of epidermic laps) which were totally disregarded here.

The opportunity I had in two cases of reopening the maxillary sinus of patients previously operate upon by my method, and on whom a relapse had been wrongly suspected, enabled me to ascertain the mechanism of the cure thus obtained. In fact I found the sinusal cavity completely filled up with a sort of fibrous hypertrophy, which at the same time perfectly accounted for the permanent impermeability of the corresponding eye to light, when an electric lamp was put into the mouth, according to Herying's method.

A new proof, that principles, as well in surgery as in other things, are not eternal.

B.

It seems to me quite as superfluous to describe here the Ogston-Luc method for the radical cure of frontal abscess, as I thought it was to describe the Caldwell-Luc's operation in the preceding chapter, for the reading of your transactions showed me that both have been often performed in this country, and it is my conviction that they could find no better support than that given by the well known skill of American surgeons.

But, however strange it may appear to you, it is my chief aim, while alluding to the operation proposed by me years ago for the radical cure of the chronic frontal empyema, to point out its drawbacks and dangers, and allow me to say that I feel some pride at recording that I have been the first to lay stress upon its weak points.

Of course the principle on which it is based (immediate closing of the frontal wound after thorough cleaning of the sinus, and further and exclusive drainage through the nose) was most tempting, and it is a matter of fact that it was often crowned with a rapid and brilliant success, the patient quickly recovering with a hardly visible scar. But such were only the favorable cases, and it is our duty to consider more attentively the unfavorable ones, consisting in abnormal extension of the sinus quite out of proportion with the caliber of the fronto-nasal outlet entrusted with its drainage. The course of things too often observed under such conditions was the following: about the 20th day after the operation a swelling appeared in the operated region, ending with a spontaneous reopening of the wound with the formation of fistula, and with the necessity of a new operation.

The natural consequence of such accidents was to throw considerable disrepute on the method: in fact, while some surgeons remained faithful to it, others returned to the old practice of keeping the wound open for a while, and others adopted the method of Kuhnt, consisting in the total resection of the anterior wall of the sinus and in the consequent suppression of its cavity, without regard for the considerable disfigurement inflicted thereby on the patient.

Things were in this unsatisfactory condition when Killian proposed a new method which is a sort of combination of the Ogston-Luc and Sasen operation or rather a combination of the advantages of all three.

In imitation of the Ogston-Luc method it implies the immediate closing of the wound and the consecutive drainage by the nose. Like Jansen's method it opens the floor of the sinus. Like Kuhnt's it removes the greatest part of the anterior wall; but its chief originality consist: 1, in preserving between the two mentioned breaches a sort of bony bridge corresponding to the orbital arcade, which greatly

preserves the normal aspect of the face; 2, in extending the inferior bony opening to the ascending branch of the maxillary bone, which gives to the surgeon hitherto unknown facilities for widening the fronto-nasal outlet and curetting the ethmoidal cells.

Allow me to record here that I am the first to have done this operation in France and to recommend it to my countrymen. After obtaining complete success with it in the eight on whom I performed it, I feel bound to proclaim here that I regard it as being at present the surest and safest method for radical cure of chronic frontal suppurations in cases whose surgical treatment is made particularly difficult by abnormal dimensions of the sinusal cavity and especially by its extension to the temporal region, whereas the Ogston-Luc method, to which the advantage must be granted of an easier performance for the surgeon and of less disfigurement for the patient, finds its ideal application in patients favored with a sinus of small dimensions.

C.

With the exception of a dubious case in which the region of the middle nasal meatus presented itself rhinoscopically filled with creamy pus, while the frontal, as well as the maxillary sinus showed themselves perfectly permeable to translumination, I have no personal record of a single example of an isolated ethmoidal suppuration, and I had consequently only to deal with this affection in connection with frontal or maxillary suppurations.

The ethmoidal labyrinth can be attacked either through the natural way of the nose, in a word, rhinoscopically, or thanks to its proximity to the frontal and maxillary sinuses, surgically, through an artificial breach, as a sequel of the radical operation for empyemas of the latter cavities. This is a subject to which I have always devoted special attention and regarding which the result of my personal experience may be of some interest to you. I will then successively consider the surgical opening of the ethmoidal cells: 1. Through the normal way of the nose; 2, during the maxillary operation; 3, during the frontal operation. A preliminary

point on which I beg to dwell here is that there is no possible hope of destroying completely the ethmoidal labyrinth through the nasal cavities. For, whilst the middle and even the posterior cells (including the sphenoidal cavity, which may be considered as the most remote of them) are within reach of our eyes and our instruments, I cannot say the same of the most anterior cells, that line the nasal-frontal outlet and which, in consequence of the extreme narrowness of this region of the nasal fossa, will always be sure to escape our reach unless we make a previous bony breach.

Therefore, while describing here the method of destruction of the ethmoidal cells, based on a new technic and instrumentation, which I have been using successfully for about two years for the radical cure of the nasal myxomas, I do not mean to present it to you as a means of radical cure for ethmoidal suppurations, but simply as a preliminary step to the fronto-maxillary operation, whose aim is to clear away the polypoid growths and hypertrophied parts of the mucous membrane, and thus facilitate the nasal part of the operation.

Another result of my experience has been to induce me to abandon entirely the use of the so-called nasal curettes for the removal of the hypertrophied, more or less myxomatous parts of the mucosa, as well as the bony cells themselves, after findlng out how powerless those instruments are in both cases. I do not doubt that your own records based on your personal experience will make you share my conclusion, that the largest curettes which we can introduce into the nasal cavities while endeavoring to clear off myxomatous growths, simply penetrate their soft tissue without removing more than a few shreds of it, and that they have hardly better grasp upon the bony ethmoid walls, the greatest number of which, after breaking easily under the pressure of the instrument, remain hanging in the nasal fossa, and I need not remind you how quickly such attempts are checked by the abundant bleeding which prevents any further view of the the field of operation.

I was then soon led to the practical conclusion, that the only instrument likely to deal successfully with the soft and easily bleeding myxomatous tissue, as well as with the honey-

combed bony tissue of the ethmoidal labyrinth, was best represented by a special forceps whose blades are large enough to seize much at a time and flat enough to be easily thrust into the deepest and narrowest recesses of the middle meatus.

I have the honor to present you here three specimens of different sizes of that instrument, which has been made according to my instructions by Mr. Vaast (of Paris). One or other of these is to be used according to the spaciousness of the nasal cavity and to the dimension of the piece of tissue to be extracted.

The technic of the operation is as follows:

If the nasal fossa is filled with abundant and pediculated myxoms, the first task is to remove the greatest number of them by means of the cold snare, until the middle turbinal becomes apparent. In case of persistent bleeding it is advisable, after plugging the bleeding region with dry gauze, to postpone the second part of the operation until the following day, when, the hemorrhage being checked, it will be possible to anesthetize duly the ethmoid region. This is best carried out by means of a long and thick strip of gauze, which, after being soaked with a solution of hydro-chlorate of cocain (1 to 5) with addition of a few drops of a solution of adrenalin (1 to 1000) is pushed deeply into the middle meatus. Another similar strip wet with the same solution is then inserted between the middle turbinal and the septum, and under the free edge of the former, and both are to be left in situ during at least ten minutes, when the region may be considered as thoroughly anesthetized and the surgeon may proceed to the really ethmoid part of the operation, after having prepared and keeping close to hand:

1. The three models of the above mentioned flat forceps.
2. A heap of long strips of dry gauze.
3. A long ordinary nasal dressing forceps, destined for the rapid introduction of the gauze after each application of the flat forceps.

In case of a bilateral affection, I consider it advisable to operate alternately on each side at the same sitting, valuable time being gained by the fact that, while the bleeding is

checked in one cavity, the curetting may be continued in the other.

The middle turbinal is to be first attacked with the largest possible type of flat forceps, whose blades are kept, during its introduction, sufficiently open to enable them to pass along each side of the turbinal and to be pushed as far as the insertion of the latter, when they are strongly pressed against one another, squeezing bone, mucosa and myxoms, then tearing them off with a rapid twisting movement. Before the bleeding has time to reproduce itself a new application of the forceps is made on the remaining part of the turbinal which, thanks to the large grasp of the blades, can be completely removed after three or four similar applications. One or two of the strips of gauze are then rapidly seized with the dressing forceps and thrust into the meatus, where they must be firmly pressed on the bleeding surface, and exactly fill up the place of the removed turbinal. After the lapse of a few minutes the gauze may be extracted, and the bleeding is then generally found to be sufficiently checked or diminished for the further curetting of the ethmoidal cells. Under the removed turbinal are generally discovered myxomatous masses which would have remained unnoticed but for the previous operation and which it is now an easy task to extract. I dare say that at this phase of the operation, after the middle turbinal has been mostly removed, the surgeon need not mind the hindrance caused by the bleeding, since he has henceforth to rely less on his sight than on his tactile sensation: any myxomatous mass, any brittle bony trabeculae met by the forceps are to be seized till the instrument finds no other resistance than that of the bony walls limiting the nasal cavity, which, are not likely to be interfered with by its blades. The only wall which I several times happened to open involuntarily is the anterior wall of the sphenoidal sinus, which in one circumstance showed itself a real representative of the most posterior ethmoidal cell. I must add that I had no reason for regretting this fortuitous extension of my operation, since it had no bad consequence for the patient, and led me unexpectedly to a new method for the opening of the latter cavity, whose description will find its natural place in the last part of this paper.

The method of ethmoidal curetting which I have just been describing has proved most efficacious for the radical cure of nasal myxoma independent of any neighboring suppuration, and has enabled me to cure completely after one or two sittings many a case which would otherwise have demanded much more time. If operated upon with the snare, according to the old proceeding, I may add that it left the patient far less exposed to relapses, thanks to the destruction of the greatest part of the ethmoidal cells, which further enabled the surgeon to detect any beginning myxomatous growth and to extract it easily on its very first appearance.

As I clearly stated on entering this chapter, the method just described, when applied to ethmoidal suppurations complicating a frontal or maxillary empyema, can but be considered as a preliminary step to the radical operation of the latter disease, since the Caldwell-Luc well as the Killian method afford the surgeon every facility for the opening and the curetting of the neighboring cells.

I have already had many opportunities of dwelling on this subject in various articles devoted to the question of the radical treatment of chronic maxillary diseases; but I feel bound to say that, as regards the curetting of the ethmoidal cells in connection with the radical operation of frontal empyema, no method seemed to be abler than Killian's proceeding to give the most radical and satisfactory results, thanks to the resection of the upper part of the ascending branch of the maxillary bone and to the large opening thus created exactly in front of the ethmoidal labyrinth, which it then becomes an easy task to open and destroy freely without any risk of the instrument penetrating the cranial cavity.

D.

Like the ethmoidal cells the sphenoidal cavity, in case of a chronic empyema not likely to be cured by such simple means as catheterism and washing, can be either opened by the rhinoscopic way or with the help of a previous artificial breach.

While discussing the choice of either of those methods, we shall have to consider: 1. The greater or less convenience

afforded to the surgeon by the spaciousness or the narrowness of the corresponding nasal fossa for an intra-nasal proceeding, 2. The coincidence or non-coincidence of an empyema of the maxillary antrum, the latter having been pointed out by Jansen, by myself and by Furst as offering the safest and easiest way to the sinus in question.

In case of the integrity of the maxillary sinus, the nasal way is only to be given up as being too narrow, if this narrowness cannot be corrected by an intra-nasal operation, for I need not say that such an obstacle as a projection or deviation of the septum ought to be previously removed.

When no more hindrances are left for getting at the sphenoidal front wall than the middle turbinal and the posterior ethmoid cells, I think there can be no simpler method for reaching and opening the concerned sinus than the one I described above for the intra-nasal curetting of the ethmoidal cells. It is a matter of fact that, while performing this curetting progressively and systematically from before backward with my flat forceps, the surgeon is naturally, and as it were, inevitably, led to opening the last of them which is nothing else but the sphenoidal sinus itself. Only in case of an abnormal resistance of the anterior wall of this cavity, it would be advisable to have recourse to a perforator, and the opening thus made should then be enlarged by means of a cutting forceps. This having been done, my flat forceps will prove again more efficacious than any other instrument and especially than the common nasal curettes for curetting the inside of the cavity, thanks to the breadth of their blades which clearly accounts for their firm grasp on the myomatous tissue, often enabling the surgeon to remove the totality of the degenerated mucosa in a single piece. I cannot too much emphasize the necessity of removing the greatest possible part of the front wall of the sinus for the same reasons which make me advise the largest possible resection of the internal wall of the maxillary antrum during the radical operation for empyema of this cavity, experience having shown what extraordinary tendency such artificial openings have to shrink and close up rapidly after the lapse of a few weeks.

The coincidence of an antral empyema with the sphenoidal suppuration should remove any hesitation as to the choice of

the best way to be followed in order to get at the sphenoidal cavity; the antral one being, as above emphasized, under such circumstances, the safest and the easiest.

As is often the case for little, as for great discoveries, it was by a mere accident that I was led to find (after Jansen, but thoroughly unaware of his contribution to this subject) this surgical way to the sphenoidal cavity. While curetting the posterior ethmoidal cells through a maxillary antrum, whose front and internal walls had been extensively laid open, I felt that my forceps were entering a very large bony cavity, which after due investigation proved to be the sphenoid antrum.

This proceeding has since then been the subject of very careful study on the part of my colleague and friend Furet, who came to the same conclusion as I: that the maxillary way, after a large resection of the anterior and internal walls of this sinus, is the most direct and the simplest to reach the sphenoidal cavity, and that owing to the complete harmlessness of this method, there should be no hesitation as to its adoption even in case of a complete integrity of the maxillary antrum, when the anatomical conditions of the nasal fossa leave no hope of getting at the sphenoid sinus by the nasal way.

XXXVI.

OBSERVATIONS ON THE DIAGNOSIS OF NASAL SINUSITIS.

By Walter J. Freeman, M. D.

PHILADELPHIA.

Most of the points to which I shall call your attention today are doubtless well known to all of you, but nasal sinusitis is so common, and the diagnosis of its exact location often so difficult, that I wish to emphasize the particular significance of certain signs as indications of its presence in one sinus or another. The frequent failure of the transillumination test renders it more than ever necessary that we should perfect and extend all other methods of examination. While the ease and rapidity with which this test can be used make it advisable that it should be employed as a routine measure, as by its means much valuable information and corroborative evidence may be secured, the reliance that has been placed upon it in the past has no doubt caused many a failure to recognize cases of inflammation of the antrum and frontal sinuses in which the physical signs were poorly accentuated. A point to be noted in this connection is, that the antrum, acting simply as a reservoir for pus from the frontal sinus, does not usually answer to the shadow test in transillumination, as pus alone does not hinder the transmission of light rays.

One of the greatest hindrances encountered in reaching a correct diagnosis is the fact that the sinusitis very frequently occurs in the narrowest side of the nose. This is in part due to interference with proper ventilation and drainage, such as we see in like conditions in the middle ear. The presence of polypi, which are almost always found in chronic cases, also frequently interferes with the detection of the cavity affected. Edema, or even congestion of the mucous mem-

brane in the immediate neighborhood of a sinus ostium is most significant and should draw our attention to this cavity.

As the disease progresses the membrane becomes more edematous, forming polypi, which Grünwald states are almost pathognomonic of sinusitis.

Taking up the anterior group of cells, comprising frontal sinus, antrum and anterior ethmoid cells, we come first to the frontal. The clinical history of the late morning headache; fullness over the eyes on leaning over; exquisite tenderness at the inner angle of the orbital roof, causing that characteristic shrinking even before pressure is applied, backed by the discovery of muco-purulent secretion at the peak of the vestibule, present a clinical picture sufficiently clear for an exact diagnosis. When, however, the disease is of less pronounced character, or when there is co-existing inflammation in some of the other sinuses, many difficulties in making even a probable diagnosis arise. In the absence of pain, usual where there is free drainage, our attention may not be directed to the frontal as the cause of a purulent rhinitis of reflex disturbances at a distant seat, but the persistent appearance of pus on the agger nasi or in the upper angle of the vestibule is so characteristic that a positive diagnosis of frontal sinusitis may be made from this sign alone. That pus from the frontal sinus tends to flow down over the nasi, and into the vestibule, rather than through the hiatus groove, is due partly to capillary attraction, the septum here being so close to the outer wall, and partly to the coincident swelling of the mucous membrane under the middle turbinal which prevents its escape in this direction.

In the diagnosis of antrum inflammation, whether acute or chronic, especially where there is only a small amount of discharge, no sign has stood me in such good stead as the discovery of pus flowing over the upper surface of the posterior end of the inferior turbinal. By this appearance alone my attention has been repeatedly called to cases of indolent or latent suppuration where there were none of the usual symptoms, and yet where most distressing and obstinate inflammation of both upper and lower respiratory tracts was evidently caused by the pus from this cavity.

Not infrequently also I have been able to make a tentative

diagnosis of sinusitis by certain well defined odors, those of sour pus and of sulphetted hydrogen. These odors are very different from that found in antrum suppuration due to dental caries, the latter being more foul and clinging, and seldom noticed by the examiner. These patients are often mistaken for cases of parosmia, and may be reduced to the verge of melancholia, unwilling to come near anyone for fear of the odor being detected. The symptom of intermittent cacosmia is very signi cant of sinus suppuration, and the antrum will usually be found to be the cavity affected. In my experience, the continued presence of foul odor of the antrum secretion almost unerringly points to the teeth as the cause of the inflammation, and this would account for the frequency of its occurrence in antrum suppuration. An exception to this will be found in cases of diseases of any of the sinuses in which foul odor is due to syphilitic necrosis.

The presence of discolored molars or bicuspids, even when they are not known to be dead, should always be viewed with suspicion, and the tests of heat and cold and of transillumination should be applied. The roots may not enter the antrum, and there may be no recognized alveolar abscess, but the presence of a carious tooth near the cavity may be the cause of repeated attacks of acute antrum sinusitis. A capped sixth year molar is always most suspicious, and before instituting any treatment of the maxillary cavity, the cap should be removed and the pulp chambers explored, although it should also be remembered that any tooth from the wisdom to the central incisor may be the cause of inflammation of the antrum. It may be that the examination of the root will reveal only a fetid odor, but the removal of the tooth should be insisted upon if the sinusitis does not quickly yield to treatment.

In endeavoring to wash the antrum through the normal opening, I have found it of value to explore first with a delicate cotton-wound probe, the point curved downward, as it thus enters the hiatus groove more readily, and after the opening has been detected and the correct curve attained, to fashion the curve of the canula exactly after it. A difference of a couple of degrees in the angle will often make the difference between success and failure in entering the cavity.

In this connection I wish to present an irrigation canula, made by Ferguson of Philadelphia, which has proved of great service to me. It is of hard rubber, and a second's heating enables one to fashion it to any desirable curve, and being elastic, it will often bend and conform to the irregularities of the surface and slip into the opening without injury to the delicate soft parts. Among other advantages over the metal tube are, that it does not cause so much discomfort, and that its lightness often permits one to allow it to hang in the sinus ostium while preparing solutions, powders, etc., to be introduced. In this way one introduction suffices to wash and medicate, when repeated introductions would cause additional pain and sacrifice time and patience. It has always been my custom to enter in the notes of each patient a drawing of the proper curve of the instrument, for there is such a variation in cases that much time is lost in seeking the proper angle anew at every visit.

In considering diseases of the ethmoid cells, I feel that I am treading on dangerous ground in expressing my opinions. While acute inflammation of these sinuses is one of the commonest conditions observed during the prevalence of grippe epidemics, I have yet to see a single exception to the rule that complete resolution takes place within a few weeks under appropriate local and constitutional treatment. That chronic suppuration of the ethmoid cells exists to the extent that certain statistics would lead us to expect, I cannot believe. Most of the cases I have seen have been inherited from other operators, and have been cured by treatment of a hitherto unsuspected antrum, frontal or sphenoid suppuration. I believe that most errors in diagnosis of ethmoidal trouble have been due to the false impression arising from probing in this region. As Zuckerkandl first pointed out, one readily obtains the feeling of bare bone where the mucous membranes are thin, as they are around the sinus openings. Woakes went so far as to claim that a special disease of the middle turbinal existed, to which the name of necrosing ethmoiditis was for a while applied, evidently being misled by the false impression of bare bone on probing, and the appearance of the bulging wall of the antrum. Time and again cases answering to his description have been brought

into consultation, and the so-called necrosing ethmoiditis has been cleared up by removal of the polypi and lavage of the antrum. By this irrigation many an unsuspected collection of pus will be found, which bulging the nasal wall inward and forcing the middle turbinal against the septum, would seem to give warrant for the removal of the turbinal. The cases of turbinectomy in which death has followed are lessons to be carefully heeded, for a fatal termination after operation seems more frequent than should be expected from the disease itself, as Semon states that brain complications are rare contingencies in ethmoiditis. Therefore, before sacrificing the middle turbinal, as is now done yearly in thousands of cases, it is due the patient at least to suspect the antrum and try irrigation, even if on account of the impossibility of reaching the normal opening it becomes necessary to puncture the sinus. Where pus is not immediately found on puncture and through irrigation, one should conclude that a failure has been made in diagnosis. The frequently repeated punctures, which are reported after a time to have demonstrated pus, must be viewed with the suspicion of having been the cause of the suppuration.

As regards the frequency with which disease of the antrum is overlooked, and ethmoid suppuration diagnosed, Lichtwitz found the former cavity affected 155 times in 243 of his cases, the ethmoids in only 11 cases. Comparing this statement with that of another well-known writer who found 150 cases of ethmoid disease, and who considers it "by far the most frequent of all diseases of the accessory cavities," and with the report of a more recent writer who found the ethmoids involved 44 times in 50 cases, it would seem that attention is still being directed too much to the ethmoids, and the antrum too much disregarded.

Except in atrophic rhinitis, or in rare cases of deformity of the septum with accompanying lack of development of the turbinals, the direct flow of pus from the sphenoid opening can seldom be seen. If viewed posteriorly, there is no certainty that the pus does not come from the posterior ethmoid cells, unless one accepts the assertion that secretion appearing at the upper part of the choanal arches is pathognomonic of sphenoid disease. Holmes in 50 cases found

the ostium of the sphenoid from 1 to 15 mm. from the opening of the posterior ethmoid cell, with an average distance of 5 1/2 mm With such a short distance between the exits of the two cavities no one can make a differential diagnosis merely from the appearance of pus here. Edema or swelling of the mucous membrane at the upper portion of the septum posteriorly should direct our attention to the sphenoid sinus just as similar conditions in the region of other openings call for examination of the other sinuses. That the formation of crusts in the vault, as asserted by Schäffer and others, warrants a probable diagnosis of sphenoid disease, I believe to be misleading. So far as I have seen, except in cases of atrophy, pus from any of the other sinuses does not form into crusts, but rather excites an active flow of mucus and serum wherever it touches the mucous membranes. Why, then, should that from the sphenoid act differently? It is true that crusts are found in the nose and vault in cases of sphenoid sinusitis, but so are they usually present when the other sinuses are involved. This is due, not to the drying of the pus from the sphenoidal sinus, but to the collection of secretion as the result of inflammation of the mucous membrane caused by the irritating sinus pus. The same dry catarrhal inflammation will be found spreading to the pharynx and larynx in these cases, and will clear up as soon as the irritating character of the sinus discharge is modified by cleansing the affected cavity, even though the discharge from the sinus still continues. As to the probing of the sphenoid sinus, Holmes found in the examination of above fifty specimens that it would have been impossible during life in 61 per cent. This assertion, however, may yet prove to rank with that of Cryer, who states that the antrum cannot be irrigated through the normal opening, an observation known from daily experience to be false. An appearance which is apt to deceive one is the yellow color of the body of the sphenoid just within the choana. This so closely resembles pus that I have at times been unable to convince myself of my mistake until I had thoroughly cleansed the surface.

Vertigo and pain at the occiput, deep in the eyes and in the ears, may be caused by disease of any one of the sinuses, and the distressing pain across the bridge of the nose, con-

sidered so characteristic of ethmoid disease I have repeatedly caused by manipulations within the cavity of the sphenoid. Indeed, in sphenoid inflammations the close proximity of the 5th nerve to the lateral wall of the sinus and the nearness of the spheno-palatine ganglion make reflex pain to any part of the head possible by reason of the rich anastomoses of the branches. I have had cases where the frontal or the antrum were positively the only cavities involved, in which pus in these cavities would give rise to intense earache, sometimes of the corresponding side, sometimes of both together, the pain disappearing each time the cavities were irrigated. Again I have seen pain and edema of the orbital tissue arise when only the antrum was involved, though one might rather expect ethmoiditis. In one case, frequent attacks of pain in the mammary region, in another pain under the shoulder blade, were relieved only by washing the antrum. As to placing great reliance, therefore, on pain as pointing to the sinus involved, it seems well established that it cannot be done, although, on the other hand, absence of pain should not cause one to exclude sinusitis.

In regard to the ocular manifestations in diseases of the accessory sinuses, Posey says that general symptoms of asthenopia which are obstinate and not relieved by glasses, should direct attention to the nasal sinuses. He further states that a slight veiling of the edges of the optic nerve with a dilatation of the retinal veins and a choking of the lymphatics around the central vessels of the retina occur in latent cases of sphenoid sinusitis, while in severe cases the ordinary signs of optic neuritis are present.

When the drainage is abundant and the turbinal swollen, a positive diagnosis of the special cavity affected is at first often impossible; but by thorough contraction by cocain and repeated cleansing by anterior and posterior syringing, one can usually arrive at a fairly accurate diagnosis by watching the flowing pus make its reappearance at the characteristic locations. This washing should be done so that the water may be caught in a black basin, for by this means one may obtain really valuable hints as to the quantity and consistency of the nose and throat secretions. The use of suprarenal extract is not advisable in examination for sinus suppu-

ration, as the blanching of the surface prevents the recognition of small amounts of secretion. A point I have found of value in carrying out the Fränkel and other position-tests, is to have the patient close the opposite nostril and sniff and blow alternately. By this means the pus is rapidly drawn from the sinus, and much time saved. Where there is difficulty in detecting the affected cavity by reason of the small quantity of pus, the patient should be examined early in the morning before the sinus has emptied, or late in the evening when the sinus, drained, it may be, during the night, has had a chance to refill. The morning is favorable for detecting pus from the frontal and ethmoids, the evening for secretion from the antrum and sphenoid.

XXXVII.

DISEASES AND TREATMENT OF THE SPHENOID CELLS, WITH REPORT OF CASES AND PRESENTATION OF INSTRUMENTS.

By Robert C. Myles, M. D.,

NEW YORK.

The subject of sinusitis of the sphenoidal cells was treated in an able and instructive manner by Dr. Hinkle before this Association in 1902. I will be brief, therefore, in my remarks and in my report of some of my cases. Everyone who has had much experience in dissecting and making sections of heads, agree concerning the great irregularity in size and position of the sphenoidal sinuses. The surgical anatomy concerns us most, and this is embraced chiefly in the area of the anterior upper wall. It is through this region that the normal secretions issue, and it is also through this space that we operate to secure proper curettage, drainage and admission of air I present a wet specimen which demonstrates the normal opening, with the sphenopalatine artery as it passes across the operative field. The internal carotid is shown lying against the thin external wall, where it can easily be wounded by the slightest deviation from the narrow, surgical path. These cells are frequently affected by acute inflammatory processes, caused by invasion of bacteria which become more or less completely pent up.

The extent of the pathological condition depends upon the virulent activity of microbes present and the amount of obstruction in the normal opening. The gummatous changes of syphilis occasionally destroy part of the sphenoidal cells. The destructive softening processes of the gumma make it rather easy to perform whatever surgery may be indicated. The sphenoidal cells are more frequently diseased than we are taught to believe. If the method of diagnosis is adopted, which requires that the condit on of every part of the nasal fossae, as well as that of every accessory sinus, should be accounted for as far as our skill and art will permit, we will have

more cases of diseased sphenoidal cells to report. When muco-pus is seen in the superior meatus or between the middle turbinal and the septum, the probe and cleansing swab should be used until the secretion is traced to its origin. Sometimes it will be necessary to remove the posterior half of the middle turbinal before the proper investigations of the region can be carried out.

I think we are often too conservative, when serious disease is suspected, in not removing this body earlier and more frequently. The soft silver probe should be used after proper cocainization and when the natural opening has been found in the latest cases, the probe should be passed in and out, with hope of drawing some of the pus with it. When the diagnosis has been made and the character of the case approximately determined, we should endeavor to make an opening of 10 to 15 millimeters in the anterior superior wall. The section should commence at the lower border of the natural opening and extend downward in a vertical line, rather close to the septum. I present a series of instruments for your inspection and consideration, and sincerely hope, that, with continued efforts, we will be able to secure safer and more effective instruments for this operation. I regret that an error occurred in the preparation of this title of my paper for the programme. I intended it to "read with report of cases and presentation of instruments." I have selected two cases, which present interesting types.

Case I.—This was a young man 30 years old, who gave a history beginning several years back. He had suffered from pain in the temporal, occipital and frontal regions, and also back of the eyes and throughout the space of the accessory sinuses. There was a peculiar degenerative process going on in all of the nasal sinuses, except the left antrum of Highmore, the left posterior ethmoidal cells and the left sphenoidal sinus. The pathological changes seemed to resemble granulation more than polypoid tissue. In certain areas the granulations were so large that sarcoma was suspected, but the microscopic examinations demonstrated only true granulation tissue. The right sphenoidal cell was constantly full of pus, which was in a state of fetid decay. After the middle turbinate had been removed, an opening was made in the anterior

wall of the sinus, a few millimeters beneath the natural opening. The wall was penetrated with a small gouge. Then the aperture was enlarged with curettes and cutting forceps until the vertical diameter was about 15 millimeters in length. The sinus was carefully curetted over the lower and inferior walls, which were covered with large polypoid granulations and putrid debris.

There was an immediate improvement in the profound depression from which the patient had been suffering, and

No. . Guarded Hand Drill.

No. 2. Protected Chisel.

No. 3. Guarded Hand Chisel or Drill.

No. 4. Guarded Trephine.

No. 5. Guarded Electric Drill.

the pain which had been vaguely located in the deeper central part of the head gradually disappeared. Repeated curettage was necessary. A membranous band formed over the opening which was easily removed and without pain. The hole is now permanent and is about 12 millimeters in diameter. The sinus can be inspected and is perfectly well. All of the other diseased cells were treated by the radical operative method, and are in good condition, with the exception of the occasional occurrence of a little muco-pus in two of them.

CASE II.—The patient was a man aged 22 years who suffered from atrophic rhinitis associated with empyema of the ethmoidal and sphenoidal cells, those on the left being the most seriously diseased. The pain was most severe directly posterior to the left occipital regions. His mind was gradually becoming affected. He was losing weight steadily and he in-

sisted that I should perform a radical operation. There was a copious flow of pus which was decidedly fetid. I removed the posterior half of the partially atrophic middle turbinal and the floors of the left posterior ethmoidal cells. The discharge diminished. Most of the pain disappeared. A free inspection of the natural opening of the sphenoidal cell was secured and a small accessory opening cell was found, situated about 1-3 of an inch below the normal opening near the outer wall. While using the soft, silver probe some ugly pus issued through it. I enlarged this opening with a long trephine and the small forceps and curettes for further enlarging the aperture. The cavity was cleansed and dressed with aristol and boric acid. The patient did well and improved for nine days, when he had a violent hemorrhage. The patient stated that from two to three pints of blood were lost within ten minutes. My assistant visited him and reported that there was evidence of his having lost considerable blood. As the bleeding had stopped no tampon was used. I visited the patient on the afternoon of the 12th day after the operation and found him quietly sleeping. When awakened he jumped up suddenly and blood gushed from his nostrils and mouth so rapidly and in such a quantity that I immediately suspected the carotid artery. Between one and two pints were lost in less than five minutes. Tampons saturated in tanno-gallic acid solution, which were fortunately already prepared, were rapidly and firmly placed in position, in and over the sphenoidal wound, The patient was removed in a carriage to the Polyclinic Hospital. The writer accompanied him because he had no confidence in the hemostasis. The patient suffered from prostration and discomfort caused by the packing. On the 15th day after the operation the packing was removed, but this was followed by a slight flow of blood. During the night another hemorrhage similar to the previous one occurred. The house surgeon tamponed both nostrils and the posterior nares. Very thin blood with but slight power of coagulation, continued to ooze through the tampons. The patient was gradually losing strength. The pulse was rapid and very weak. It was not considered safe to adminster an anesthetic, so I asked Dr. J. A. Bodine to tie the left external carotid by his hypodermic cocain method

using 1-10 per cent. solu ion. There was no manifestation of pain during the procedure, except when the cocain was being introduced, and when an enlarged cervical gland was touched. A catgut ligature was left in place around the common carotid artery for 24 hours, after the ligation of the external carotid, for the purpose of controlling any bleeding that might occur from the internal carotid. The packing was gradually removed during the next 3 or 4 days, and though considerable oozing occurred after each disturbance of the tampons, there was no alarming hemorrhage. The patient after several weeks of slow convalescence commenced to improve rapidly and now weighs about fifteen pounds more than he did at the time of the operation. I saw him a few weeks since and could find no pus in the sphenoidal cells. Several cases somewhat similar to this one, have been reported and it is a question in the minds of the operators as to which artery was to be considered responsible for the hemorrhage. Another important question is whether we should permit patients who have been operated on for sphenoidal disease to pass from under our control for at least three weeks after the operation.

DISCUSSION ON THE PAPERS OF DRS. LUC, MYLES AND FREEMAN.

Dr. J. N. Bryan called attention to a specimen he wished to present which showed a peculiarity of the sphenoid sinus, which was unusually large and extended down into the pterygoid process. If entrance to the sphenoidal cells had been attempted in this case through the antrum, the lower extension of the sphenoid would not have been reached.

Dr. Emil Mayer stated that he would like to express to Dr. Luc his very extreme pleasure at having been able to hear the classical paper he had presented, and in this connection he wished to express his grateful appreciation for the long journey he had taken to be present at this meeting, and he believed that he voiced the sentiments of his associates. Dr. Luc's work had been largely copied in America and in most instances where operations on the antrum of Highmore and the frontal sinus are performed, those known as the Ogston-Luc and the Caldwell-Luc are the ones most frequently performed.

He was especially pleased to note that when washing of the antrum of Highmore was spoken of by Dr. Luc that he said he punctured and then washed out. Ordinarily washing out of the antrum of Highmore through the natural openings is a practical impossibility, that is to say, that while the canula may be introduced into the natural opening and some fluid forced into it, yet thorough drainage becomes a practical impossibility. To enter the antrum of Highmore the canula would have to have the shape of a shepherd's crook, hence the speaker preferred puncturing in those cases where treatment was necessary.

In removing the middle turbinate, the method most in vogue with us consists in first removing with the Holmes scissors, the enlarged cell, and there he could readily see the advantages of the instruments here presented by Dr. Luc.

Regarding the treatment of the sphenoidal sinus, it has been shown over and over again that the sphenoidal sinus may in most instances be reached best by way of the antrum of Highmore and the ethmoid cells; thus each step of the operation could be carefully watched and the entire operation done in a surgical manner, and the speaker believed that ultimately the operation on the sphenoidal sinus would be done in this way. He had seen Jansen enter the sphenoidal sinus frequently in this way and the manner of procedure had struck the speaker as being rational, as complete control of the field of operation was thus obtained. In this connection the speaker presented an instrument for retraction of the cheek (instrument shown). The advantages were that it would not slip and afforded a most admirable exposure of the field for operation and dressing.

DR. T. J. HARRIS referred to his experience with Dr. Luc's method in frontal sinus disease. His results at first had been excellent; later less so.

He had carefully studied Killian's operation and thought the removal of the lower inferior wall of the frontal sinus would be found difficult. It was the difficult step of the whole procedure.

Concerning the function of the antrum and its relation to intranasal secretion, he would say that whenever he found pus in the nose he suspected antrum disease. He daily used

the Myles antral trocar and found it a most useful instrument.

Dr. Gordon King enumerated the various operations on the frontal sinus and expressed his preference for the modified Caldwell-Luc method, but even after this method of operation there were difficulties to be overcome. The drainage opening into the nose was apt to close up before the sinus was healed and it was on this account often necessary to reopen the wound. He was in favor of the Kuhnt operation except for the great facial deformity caused thereby.

He mentioned a case of double frontal sinusitis in which both of the sinuses were very large and in which the sinus condition was aggravated by the presence of an orbital abscess. In this instance he had done an operation which was essentially a combination of the various methods mentioned in the present discussion, a Kuhnt-Ogston-Luc operation with drainage into the nose and the removal of the anterior wall of the frontal sinus and implantation of the flap against the posterior wall of the sinus. In this case there had naturally followed the customary deformity of the Kuhnt operation, but the ultimate result had been satisfactory.

Dr. King called attention to the fact that a temporary infraorbital neuralgia sometimes followed the Ogston-Luc method, and wished to know if Dr. Luc had ever observed such a result in his experience.

Dr. J. W. Gleitsmann called attention to the fact that in 1895, at the meeting of the Association in Rochester he had reported a case of severe hemorrhage following operation on the sphenoid. He advocated the application of liquid vaseline to tampons left in this region before removal of the latter was attempted.

He also called attention to the fact that at that same meeting he had stated that the distance through the anterior nares between the middle turbinate and the septum, to the anterior wall, was three and one half (3 1-2) to four (4) inches and to the posterior ethmoidal cells six and one quarter (6 1-4) inches. He was now speaking of chronic cases, for in acute disease the anterior wall was as a rule not corroded. He had, however, recently seen a case of a slender man six feet tall, in

whom the antero-posterior distance from the tip of the nose to the sphenoid, was five and three quarter (5 3-4) inches, There consequently could be no invariable rule as to this distance.

Dr. J. H. Bryan asked if there had been much tendency in the antro-sphenoidal route to closure of the openings made.

Dr. Luc replied in closing that he had not noticed any tendency to closure of the openings made in the antro-sphenoidal method. He expressed his harmony with the views of those who favored large openings—in order to cure well we must see well, and large openings allowed better treatment of the bleeding. It was difficult to resect the floor of the frontal sinus, but after incision and along the anterior edge of the wound we have a complete view of the floor.

Killian's operation was of great importance. We have to choose between the open method of wound treatment of a suppurating cavity and the closed method with disfigurement of the patient. An unexpected result followed in one operated on with Killian's method. It was a rise of the fatty tissue in the orbit helping to support and maintain the general contour of the face. In this way we could suppress the cavity and retain facial symmetry.

The introduction of the finger is of the greatest importance and we should carefully follow along the anterior part of the bony bridge so as to know just what we want to do, hence we establish complete drainage between the nose and the frontal sinus.

Replying to the inquiry of Dr. King, he stated that he had not found neuralgia following his operations. For a while the tissues about the frontal and maxillary sinuses were devoid of their usual sensibility, but there was no neuralgia.

Dr. R. C. Myles was always glad to follow the methods of Dr. Luc. He relieved antral irrigation through the natural opening quite feasible and in this matter would have to take issue with Dr. Mayer. In a healthy sinus irrigation might not be possible, but wherever there is an extensively diseased condition the hiatus semilunaris is usually pressed inward and thickened and a canula with the proper curve will generally reach the antrum.

Dr. Freeman in closing said he entirely agreed with Dr. Myles that the ostium maxillare was more readily probed when the sinus was diseased than in the normal state. This is due to the bulging of the wall inward and to the unfolding of the hiatus groove. As a rough estimate, he thought that in four-fifths of such cases the cavity could be irrigated, and that some could be cured by this method alone. Of course where there were granulations or polypoid degeneration of the lining membrane, irrigation alone would prove of little value.

XXXVIII.

A BONY CYST IN THE ANTRUM OF HIGHMORE.

By C. G. Coakley, M. D.,

NEW YORK.

Large bony-walled cysts that completely fill the cavity of the maxillary antrum are of such infrequent occurrence that the writer thinks the case reported may prove of interest.

H. G. A., female, aet. 29, born in Scotland, remembers that when 9 or 10 years of age, she had a swelling appear on the face just beneath the left side of the nose. At or about the same time a lump appeared on the roof of the mouth to the left of the median line. To the best of her recollection neither swelling was painful. The swelling on the face gradually subsided after the left median incisor was extracted. At the present time there is but one incisor tooth in the upper jaw on the left of the median line, and there has been but one since the extraction above mentioned. The lump on the hard palate has persisted as a painless one all these years, merely giving some annoyance during mastication and phonation.

About two years ago the second bicuspid tooth of the upper jaw on the left side pained her considerably, and accompanying it there was a marked swelling over the anterior surface of the left antrum. This tooth was extracted, the pain subsided, but the swelling persisted.

In January, 1903. Miss A. contracted the grippe. In addition to the usual symptoms of the disease the patient noticed a great increase in the swelling on the face and on the hard palate. The patient could swallow only with difficulty on account of the mechanical impediment that the latter mass offered. The increase in size was not accompanied by any pain. There was no nasal obstruction, nor any evidence of

a difference in the character or amount of secretion in either naris.

Dr. Lindenbaum, of Jersey City, in order to relieve the dysphagia, incised the mass on the hard palate. After the knife had penetrated about an eighth of an inch of soft tissue it entered a cavity from which there escaped a thick, light yellow, turbid, inodorous fluid. The amount was about "two tablespoonfuls." The immediate relief was great, but at the end of 48 hours the mass and the attendant discomfort were as great as ever. Repeated incisions at intervals of two or three days were practiced for about a month, when it was noticed that the discharge had become much thinner and of a decidedly foul odor. The swelling on the face over the antrum kept increasing and became painful. The gingivo-buccal fold bulged outward and incisions were also made into its most prominent part. The discharge had the same appearance and foul odor as that obtained from the palatal incisions.

At the end of a month of this treatment, the patient not having improved, Dr. Lindenbaum referred the patient to me on March 5th.

EXAMINATION.

The patient's left side of the face is greatly swollen and tender, but not discolored. An ovoid, tense, and slightly red mass occupied the entire left half of the hard palate, the lower surface of which was convex instead of concave. It extended beyond the median line to the right, spreading over about half of the hard palate on that side. The gingivo-buccal fold was bulged outward by a hard mass. In it, opposite the first bicuspid tooth, there was a small fistula from which oozed on pressure a few drops of offensively smelling pus. The nares, both anterior and posterior, were normal with the exception of a slight bulging on the floor of the left, just within the vestibule.

Transillumination of the face showed complete darkness on the left side, even down to the level of the teeth.

A probe inserted into the fistula readily entered a large cavity. A canula was next inserted into the cavity through the fistula and the cavity irrigated with normal saline solution. Considerable pressure was needed to get a return flow, the irrigation fluid mixed with pus returning around the side of the canula. None of the fluid passed into the naris.

The patient was advised to enter Bellevue Hospital for operation. This she did on March 6th, and on the same day, under ether administered by Dr. Creevy, by the Crile method, I made an incision two inches long in the gingivo-buccal fold parallel to and one-fourth of an inch above the lower border of the gums. It was practically impossible to strip up the periosteum from the anterior surface of the superior maxilla, as the two were so intimately adherent and the bone so thin and porous that the elevator kept penetrating the cavity. I reached my index finger through the wall which was more like a pyogenic membrane filled with bone salts than anything else I can liken it to. The finger reached the level of the orbit, and passed beneath the anterior third of the nose as far as the middle hard palate. My opening was enlarged until it was about an inch in diameter, and I proceeded to curette the cavity. The material that came away had much the appearance of that found in chronic empyemata of the antrum, viz.: grayish, gelatinous, polypoid masses. The hemorrhage was considerable. On seizing some of this tissue with a forceps, a piece of the lining more than an inch square came away from the vault. It retained its dome-like shape and was found to have a thin bony wall. Several other pieces not so large, were similarly removed. The greatest difficulty was experienced in clearing the anterior wall of the antrum on account of the intimate adherence to the muscular tissue. No bone was encountered in curetting the prolongation under the nose and in the hard palate. When scraping in the latter region, the curette at one place entered the floor of the nasal cavity. The wound was packed with a long strip of iodoform gauze. This was removed at the end of 48 hours, the cavity irrigated with normal saline and repacked. This procedure was repeated at intervals of two or three days for about two weeks. The patient left the Hospital on the tenth day after the operation.

The subsequent treatment has consisted in repacking the cavity, without irrigation every three or four days.

MICROSCOPICAL EXAMINATION.

The large dome-like piece of tissue removed was placed in 4 per cent. formalin solution for two days, then decalcified in sulphurous acid, washed, re-hardened, and cut. Fig. 1 is a drawing made from a portion of the sections. Near the center can be seen a lamella of bone, somewhat irregular in thickness. At one place there is noticed a break in the continuity of the bone. This is of frequent occurrence as we look over the various sections. Above the bone will be seen the normal mucous membrane of the anterior antrum. My belief is that this is really that part of the mucous membrane

of the antrum that formed the floor of the antrum. That with the growth and enlargement of the cyst it was carried up before it. It is rather remarkable this membrane shows no signs of inflammatory involvement, although in such close proximity to a cavity filled with foul pus for a month at least. The cilia on this membrane even are well preserved.

On the opposite side of the bone is shown the deeper structure of the lining membrane of the cyst proper. It consists of a not very dense connective tissue with moderate round cell infiltration. Blood vessels of various sizes are

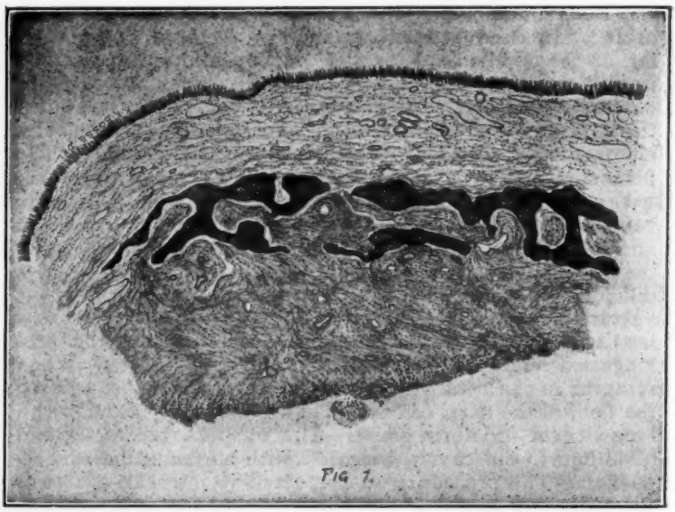


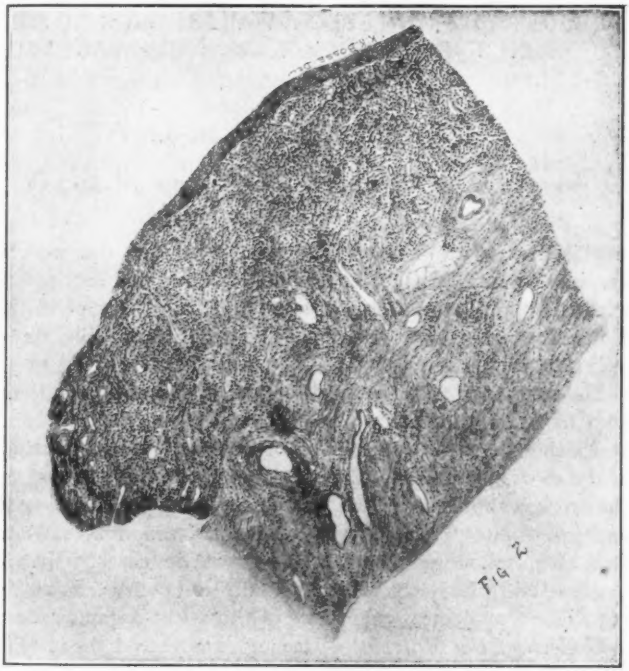
FIG 1.

quite numerous, but no glandular structures are to be seen. Only a portion of the cyst wall remains attached to the bone, the superficial portion having been removed in the earlier curetting.

Fig. 2 is a section slightly oblique, from the curettage of the cyst. Its lower portion has a structure like that attached to the bone in Fig. 1. Its superficial portion is much more densely filled with round cells. Again no glands are found. In this respect the lining of cysts of dental origin differ from the polypoid hypertrophies of the mucous membrane of the antrum found in chronic empyemata of the antrum. The epithelial lining is seen to be of flat cells, arranged in two or three layers.

A most exhaustive study of dentigerous cysts was made

by Magitot. His researches appear in the *Archives Generales de Medicin*, Vol. II, 1872, pp. 399–414, and pp. 681–699, also in Vol. I, 1873, pp. 155–174. It seems probable that in our case we had a cyst forming from the root sack of the left upper median incisor. That it first invaded the hard palate, pushed its way under the nasal cavity, and finally invaded the antrum. The root of the second bicuspid prob-



ably pressed upon, its circulation interfered with and thus diseased. The irritation from this diseased tooth produced an increase in the secretion of the sack and a considerable increase in its size. On the extraction of this tooth the cyst remained quiescent until the attack of grippe caused such an increase in the fluid as to get the patient to seek relief from the mechanical effect. With the entrance of pus producing germs through the incisions about a month later, the pain, mild sepsis, and fetid discharge kept up until the time of the operation.

XXXIX.

THE MICROSCOPICAL EXAMINATION OF THE DISCHARGE IN ONE HUNDRED CASES OF MIDDLE EAR SUPPURATION, WITH AN ANALYSIS OF THE RESULTS, HAVING SPECIAL REFERENCE TO THE PRESENCE OF TUBERCLE AND "ACID-FAST" BACILLI.*

By Wyatt Wingrave, M. D.,

PHYSICIAN AND PATHOLOGIST, CENTRAL THROAT AND EAR HOSPITAL.

This investigation was undertaken not with the view of making an exhaustive bacteriological search, but chiefly with the object of testing the value and reliability of microscopical examination for acid-fast bacilli available under ordinary circumstances.

The sources of the material were for the most part patients who had not previously undergone any special treatment, and although many of them afforded family and personal evidence of tuberculosis, they were not perfectly selected for that reason, but were taken in the ordinary course of out- and in-patient practice at the Central London Thoat and Ear Hospital, together with a few private cases. Mr. St. George Reid, the bacteriologist, kindly co-operated in verifying the morphological characters of the micro-organisms.

Collecting the Material.—Having experienced the unreliability of scrapings taken from the superficial regions of the auditory meatus, the discharge was always taken from the deepest available part, as near as possible to the diseased area. In some instances the granulations themselves, with the pus and débris, were triturated with a 2 per cent. solution of sodium sulphate, and centrifuged before staining.

*Communicated to the Otological Society of the United Kingdom February 2, 1903, in opening a discussion on "Tuberculosis of the Ear, the Nose and the Naso-pharynx."

Age—Under 1 year	2
2 to 6 years	6
7 to 14 "	21
15 to 21 "	29
22 to 31 "	18
32 to 51 "	14
52 to 62 "	1
Sex—Equal in number.	
History of Phthisis, family or personal	42
Acid- and Alcohol-fast bacilli	24
B. T. (presumptive)	17
Pseudo-B. T.	7
Of the 17 B. T., 12 had history of phthisis.	
" " 5 had no history of phthisis.	
Of the 7 P. B. T., 5 had history of phthisis.	
" " 2 had no history of phthisis.	
Squames and Pus Cells present together	41
Squames alone	21
Pus alone	38
Bacteria:	
Staphylococci	41
Diplococci	20
Streptococci	7
Bac. proteus vulg.	14
Mic. tetrag.	4
Bac. coli.	3
Gonococci	3
Bac. subtilis	2
Aspergillus nig.	1
Leptothrix	1
Diphtheria (Klebs-L.)	1
Yeasts	1

Routine Staining.—The discharge was removed with a small curette, squeezed between sterlized cover-glasses, and fixed by heat. After boiling in carbol fuchsin for three minutes the smear was placed in 25 per cent. sulphuric acid until all color had disappeared; but if on washing with water the color reappeared the acid bath was repeated. After further washing in water, if apparently colorless, it was soaked in absolute alcohol for five minutes counterstained with

methylene blue, washed, dried, and mounted in xylol balsam.

Although this process may be carried out while the coverglass is held by Cornet's forceps it will be found that the details can be more thoroughly and as quickly performed in a test-tube, using a liberal supply of solutions.

Specimens from the same cases were also stained by Gram's method, which proved more reliable than methylene blue as a general stain. They all resisted the action of 5 per cent. solution of tartaric acid after prolonged soaking.

SYNOPSIS OF TABLE OF RESULTS.

On referring to the table (pp. 6-8) it will be seen that the cases were all suffering with chronic suppuration of the middle ear with the three following exceptions:

No. 50 was one of chronic non-suppurative disease of the middle ear in a patient suffering with pulmonary tuberculous.

No. 52 was that of an infant ten months old suffering with mastoid abscess and a discharge of four days' duration, under Dr. Jakin's care. The abscess and discharge both contained gonococci.

No 76 was also that of an infant twelve months old with a discharge of five days' duration. This also contained gonococci.

It will be seen that in twenty-four cases bacilli which resisted acid and alcohol were present. Of these seventeen conformed to the morphological characters of the bacillus of tubercle, and, further, were accompanied in twelve instances with either a personal or family history of tuberculosis. These are described as presumably genuine tubercle bacilli. The remaining seven cases showed bacilli varying in several respects (size, shape, etc.) from the orthodox features, although affording the correct staining reactions, and are grouped as *Pseudo-tubercular*, as suggested by Pappenheim. In these also there was a history of tuberculosis in four cases. The number of bacilli present in each smear varied considerably, from twelve in each field to less than a dozen in a whole smear.

We now know that all acid-fast bacilli are not necessarily tubercle, and in considering their significance it may be well to enumerate some of the chief non-tubercular acid- and alcohol-fast bacilli which have been reported.

1. *Smegma bacillus.*—This is acid-resisting, but is readily bleached by alcohol—less so by acid. It is smaller than that of tubercle, and is said to be found only on the male genitals.

2. *Leprosy Bacillus.*—This may be disregarded in the present investigations, owing to its rarity in this country.

3. *Timothy and other Grass Bacilli.*—Resist both acid and alcohol, but in oculation experiments have proved negative.

4. *Lustgarten's Bacillus of Syphilis.*—The identity of this bacillus has not received satisfactory confirmation. It, however, is easily bleached by acid—less so by alcohol.

5. *Butter Bacillus.*—This is probably identical with a grass bacillus.

6. *Bacillus of Pulmonary Gangrene.*—This has been described by Pappenheim* as a *Pseudo-tubercular bacillus*, while Fraenkel† attributes its resistance to acids, to the putrefactive changes being rich in fatty acids, etc.; for when occurring in sweet sputum they give up their stain readily.

7. Lubarsch‡ also found similarly selective bacilli in: (*a*) Purulent bronchitis; (*b*) bronchiectasis; (*c*) abscess near hip-joint; (*d*) sebaceous cysts; in all of which cases inoculation results were negative.

8. Folli§ found acid-fast bacilli in three out of six cases of non-tubercular pulmonary gangrene. He observed that 5 per cent. solution of tartaric acid, while genuine tubercle bacilli required twenty minutes. This reaction I have not been able to confirm, as already mentioned.

In addition to these, there are many others which are referred to in the appendix.

*Pappenheim: Brit. Med. Jour., June 14, 1902, Epitome.
†Fraenkel: Brit. Med. Jour., June 14, 1902, Epitome.
‡Lubarsch: Deut. Aertz. Zeit., October 15, 1901.
§Folli: Rif. Med., August 27, 1901.

Thus we have evidence that many bacilli exist which may be mistaken for tubercle, and we must not be too ready to accept their identity, whatever their source may be.

This investigation has revealed another possible source of error. In about 60 per cent. of the preparations epithelial squames formed a most striking feature; they retained the fuchsin to a remarkable degree, in spite of prolonged treatment by acid and alcohol. It was noticed that the older the squames the more vividly they retained the fuchsin, the younger ones being paler, whilst the most recent of all being unstained with fuchsin, but readily selecting the methylene blue. This property is prabably due to the increase of keratin and fatty substances, the result of degenerative age-changes in the cell, and supports Fraenkel's suggestion that the fuchsin selecting and retaining power of some bacilli is due to the degeneration products and fatty acids of putrefaction.

These cells often break up into small, irregular shaped rods and granular clumps, which may be readily mistaken for micro-organisms of the acid-gas group.

They are of still further interest in possessing a diagnostic value, since if the smear be taken from the deepest part of the ear they afford strong presumptive evidence of cholesteotoma, especially, when, as not unfrequently happens, they are more numerous than pus-cells. They are invariably accompanied with a distinctive sour fetor—that of decomposing epidermis, probably due to fatty acids and sulphur, in marked contrast to that of bony necrosis, which has more the character of phosphorus.

Cases of Special Interest.—No. 15 is that of a female with a strong family history of tubercle, four having died from phthisis. In addition to suffering with pulmonary tuberculosis, she is nearly blind with double optic neuritis, which Mr. Treacher Collins attributes to a retrobulbar tubercular lesion. She has suffered with suppurative discharge from both ears for seven years, in which I have found bacilli on each of several examinations. The sputum afforded similar results.

No 50 was one of chronic non-suppurative middle-ear dis-

ease of eight years duration. There being evidence of some accumulation in the right ear, Dr. Dundas Grant performed paracentesis of the membrane, evacuating a few drops of inspissated matter, which contained tubercle bacilli. His sputum afforded abundant evidence of the same bacilli.

Gonococci occurred in three cases, two of which were infants and one was a male aged thirty-nine. The presence of this organism is not without interest, especially during infancy.

In No. 74 tubercle bacilli were found not only in the aural discharge, but also in the pus of the cerebral abscess, operated on by Dr. Dundas Grant. She had a strong family history of phthisis and was much emaciated, but made an excellent recovery.

Conclusions.—This investigation shows that acid- and alcohol-fast bacilli are demonstrable in a large proportion of chronic purulent ear discharge.

That in seventeen cases they were presumably tubercle bacilli, in so far that they conformed to the recognised morphological and staining characters and were for the most part associated with reliable clinical evidence of tuberculosis.

That in seven (pseudo-tubercle bacilli) cases, while conforming in a greater or less degree to the staining requirements, they were morophologically unlike tubercle bacilli, yet five of them had either a family or personal history of phthisis

That success in their demonstration in any great measure depends upon the methods of collecting and staining together with perseverance in search.

That in the peculiar selective action of the squames in retaining the carbol fuchsin—a property specially attributed to certain bacilli—we have at once a possible source of error in diagnosis and an explanation of the peculiar affinity of other bacilli for fuchsin.

Column 1 refers to the nature of the aural disease.
" 2 gives the duration of the aural symptoms.
" 3 The sign + that there was either a family history of tubercle or that there was a clinical evidence of such in the patient, independently of the ear.

" 6 B. T. refers to acid- and alcohol-fast bacilli, presumably-tubercular.

P. B. T. represents Pseudo-bac. of tubercle.

B. P. V. refers to *Bac. proteus vulgaris.*

N. B.—An exhaustive list of bacteria found is omitted.

" 7 records the organized cells present, in order of prevalence.

	1	2	3	4	5	6	7	
	Disease.	Duration.	History of Phthisis.	Age.	Sex.	Bacteria.	Cells.	Remarks.
1	C. S. M. E.	3	0	23	F.	Diplococci, staphylococci	Pus, few squames.	
2	"	1 mo.	0	13	M.	Streptococci.	Pus.	
3	"	3	0	25	M.	Staph.	Squmes, pus.	
4	"	6	0	13	F.	Staph.	Squames	
5	"	21	0	21	M.	B. P. V., staph.	Squames, pus.	
6	"	2	0	16	M.	B. P. V.	Squames, pus.	
7	"	6	0	24	F.	None found.	Squames.	Cured.
8	"	14	0	17	F.	Dipl.	Squames, pus.	
9	"	31	+	36	F.	Staph.	Squames.	
10	"	3	+	14	F.	B. T. B. P. V	Pus. squames.	
11	"	4	+	23	F.	P. B. T.	Pus, squames.	
12	"	6	0	20	M.	Staph.	Squames.	
13	"	4	+	34	F.	Staph.	Pus. squames.	
14	"	4	+	17	F.	Staph., P. B. T.	Squames.	
15	"	5	+	24	F.	Staph. B. T. B. P. V.	Pus, squames.	Optic neuritis.
16	"	—	0	—	M.	Staph., B. T.	Squames, pus.	
17	"	15	+	38	F.	Staph.	Squames.	
18	"	—	0	—	F.	P. B. T.	Squames.	
19	"	15	+	18	M.	P. B. T.	Squames.	
20	"	9	0	38	M.	B. T.	Squames.	
21	"	3	+	—	—	P. B. T.	Pus.	
22	"	7	+	15	F.	B. T., dipl.	Pus, squames.	
23	"	4	+	19	F.	Dipl.	Pus.	
24	"	7	0	11	M.	staph., leptothrix.	Squames.	
25	"	4	0	17	F.	Dipl., staph.	Pus, squames.	
26	"	18	0	22	M.	Dipl.	Squames.	
27	"	20	0	34	M.	Staph., yeasts.	Squames.	
28	"	5	+	22	F.	B. T.	Pus.	Cerebral [abscess.
29	"	4	—	19	M.	Strept. bac.	Pus.	
30	"	17	+	22	F.	Strept.	Pus.	
31	"	12	0	19	M.	Dipl., B. T.	Pus.	

32	C. S. M. E.	4	+	11	F.	B. P. V.	Pus.	
33	"	2	0	12	M.	P. B. T.	Pus.	
34	"	1	0	8	F.	Mic. tetrag.	Pus.	
35	"	16	+	21	F.	—	Pus, squames.	
36	"	20	+(d)	24	F.	P. B. T.	Pus, squames.	
37	"	12	+	17	F.	B. T.	Squames, pus.	
38	"	?	0	14	M.	Strept.	Pus.	Cerebellar abscess.
39	"	4 mo.	0	4	M.	Staph. P. B. V.	Pus.	
40	"	11	+	21	F.	Staph., B. T.	Pus, squames.	Gran. triturated, Stacke.
41	"	40	0	62	F.	B. P. V.	Squames.	
42	"	18	+	18	M.	Staph., dipl.	Squames. pus.	
43	"	1	0	14	F.	Staph.	Pus.	Supp. glands.
44	"	3	+	21	F.	Staph.	Squames, pus.	
45	C. S. M. R.	6	0	18	F.	Asperg. n.	Squames.	The purulent discharge had ceased 2 years.
46	"	17	0	24	F.	Staph., B. subtilis.	Pus, squames.	Epithelioma.
47	"	—	+	7	M.	Staph.	Pus, squames.	Rad. mast. oper.
48	"	6	0	21	F.	Mic. tetrag.	Squames, pus.	
49	"	5	+	14	M.	Staph., dipl.	Pus.	
50	C. C. M. E.	8	+	27	M.	B. T.	Caseat, pus.	Paracent. tymp.
51	C. S. M. E.	12	0	21	F.	B. subtilis, staph.	Pus, squames.	
52	A. S. M. E.	4 days.	+	10 mo	F.	Gonoc., strept.	Pus.	Mastoid abscess.
53	C. S. M. E.	6	0	9	M.	Staph.	Pus.	Supp. glands.
54	"	4	0	8	M.	Staph.	Pus, squames.	
55	"	1	+	3¼	M.	B. T.	Pus.	Died general tuber.
56	"	1	0	15	F.	Strept.	Pus.	Supp. glands.
57	"	16	0	20	F.	B. T.	Pus, squames.	
58	"	6	+	24	F.	Dipl., staph.	Squames.	
59	"	6	0	13	F.	Staph.	Pus, squames.	
60	"	2	+	20	M.	B. P. V.	Pus. squames.	
61	"	9	0	15	F.	Staph.	Pus.	
62	"	10	0	21	F.	Dipl.	Squames.	
63	"	4	0	19	M.	B. coli c.	Pus.	After two years' treatment.
64	"	20	+	33	M.	B. P. V.	Pus.	
65	"	12	0	37	M.	B. P. V.	Squames.	
66	"	10	+	13	M.	Strep. B. T.	Squames, pus.	Right hemiplegia, optic neuritis (double).
67	C. S. M. E.	6	+	16	F.	B. T. (twice).	Squames, pus.	
68	"	26	+	31	F.	No B. T.	Pus, squames.	
69	"	2 mo.	0	4	M.	B. T.	Pus.	
70	"	14	+	40	F.	P. B. T. (?)	Pus, squames.	
71	"	—	0	4	M.	P. B. T.	Squames, pus.	Extremely fetid.
72	"	7	+	33	M.	B. P. V.	Squames, pus.	Pulmon. gangrene.
73	"	5	+	6	M.	Staph.	Squames. pus.	Supp. glands.
74	"	10	+	21	F.	B. T.	Pus.	Cerebral abscess.
75	"	4	0	39	M.	Gonoc.	Pus, squames.	Adenoids and supp. glands.

76	A. S. M. E.	5 d'ys	+	1	M.	Gonoc.	Pus.	
77	C. S. M. E.	6 mo.	0	5	M.	Dipl.	Pus.	
78	"	15	0	35	M.	No B. T.	Squames.	Very fetid, Stacke; cholesteatom.
79	A. S. M. E.	3 wks	0	6 mo	F.	Dipl bac., staph.	Pus.	
80	C. S. M. E.	25	0	27	F.	B. P. V.	Squames, pus.	Rad. mast. op.
81	"	11	+	37	M.	Staph.	Squames. pus.	
82	"	8	0	18	M.	Staph.	Squames. pus.	
83	"	13	+	14	M.	B. T.	Pus, squames.	
84	"	20	0	22	F.	B. P. V.	Pus, squames.	
85	"	6	0	12	M.	Staph.	Pus.	
86	"	5	0	9	M.	B. P. V.	Pus, squames.	
87	"	1¼	0	11	F.	No B. T.	Pus.	Enlarged glands.
88	"	21	0	12	F.	Staph.	Squames.	
89	"	17	0	18	M.	Dipl., staph.	Squames, pus.	
90	"	3½	0	5	M.	Dipl., staph.	Pus.	Stacke: acute mast. abscess.
91	"	5	0	22	F.	Staph.	Pus.	
92	"	30	+	35	F.	Mic. tetrag.	Squames.	Very fetid.
93	"	18	0	20	F.	No B. T.	Pus, squames.	
94	"	5	0	10	M.	Staph.	Pus.	Supp. glands.
95	"	6	+	11	M.	B. P. V.	Pus.	
96	"	4 mo.	0	12	M.	Dipl., staph.	Pus.	Facial paralysis.
97	"	15	0	35	M.	No B. T.	Pus.	Very fetid.
98	"	20	0	27	M.	Staph., dipl.	Squames.	
99	"	6	0	7	F.	Staph.	Pus.	
00	"	2	+	27	M.	Mic. tetrag.	Pus.	

XL.

A CASE OF THROMBOSIS OF THE CAVERNOUS SINUSES.*

By Samuel Lodge, M. D.

SURGEON TO THE EYE, EAR, THROAT, AND NOSE DEPARTMENT OF THE ROYAL HALIFAX INFIRMARY.

The patient, a married woman, aged forty-one years, was seen in consultation with Dr. Thomson of Shelf on December 13, 1902. Dr. Thompson gave me the following history:

"He saw the patient on November 9, 1902. She complained of neuralgia, most acute, confined to the left supra-orbital, temporal and malar regions. She also had a dull pain at the back of the left eye. There was nothing to be seen at this time externally, but there was a distinct fulness between the left alveolar margin and the cheek. The teeth were very bad; no tenderness over the swelling which was, however, incised freely; but no pus found. Temperature, normal. The family history was good and there was no history of syphilis. The excruciating pain continued for the next ten days, when at the end of this period she described it as throbbing in character. Temperature 99·5°.

"On November 28, 1902, a swelling was noticed extending almost from the base of the left tonsil to the second or third molar. This was incised, and a quantity of thick creamy pus evacuated. Patient obtained relief from pain for twenty-four hours, and enjoyed a little natural sleep for the first time since the onset of symptoms. A week later a further incision was made as there seemed to be a collection of pus be ow the former opening; small amount of pus escaped. On the fol lowing morning there was some edema of the left lower eyelid: the pain had practically disappeared, The edema

*Communicated to the British Laryngological, Rhinological, and Otological Association, March 13, 1903.

rapidly spread in the next forty-eight hours to the upper lid and conjunctiva, also to the right eye, which became affected in a similar manner—namely edema of both lids and chemosis. The edema extended to the root of the nose and on to the forehead. There was edema about the angle of the jaw on the left side. Patient complained of pain in the left ear, accompanied by a little discharge.

"On December 12 a tooth was drawn, and the antrum of Highmore explored, without finding any pus. Temperature, 100-5°".

On December 13 I saw her with Dr. Thomson. We diagnosed thrombosis of the left pterygoid plexus extending to cavernous sinuses, which at first was probably idiopathic in nature, causing a passive edema, which afterward had become infected from the mouth, or that a septic throat or mouth had caused the thrombosis.

The patient was admitted into the Royal Halifax Infirmary on December 13, 1902. On admission both eyeballs were markedly proptosed. The upper and lower lids of both eyes were red, edematous, and there were ptosis. The ocular palpebral conjunctiva was chemosed, and protruded between the closed lids, but the chemosis did not cover the corneae. There was a slight muco-purulent discharge; the corneae were clear. The ocular movements were limited in every direction. Sight was not impaired to any very marked degree. Pupiary reactions were sluggish; slight myosis. Beyond fulness of veins, there were no gross fundal changes. There was a circular patch of edema at the root of the nose, which extended on to the forehead, about the size of of a crown piece. The skin there was slightly red, but not tender. There was also a brawny edema extending forward and upward from the angle of the jaw on to the left side over the pterygoid and the malar regions. A little tenderness existed over this area. The mouth was in a very dirty condition, the teeth very bad, and pus could be seen oozing from the socket of the last molar. The left tonsil was swollen and congested. The swelling extended from the base of the tonsil forward along the soft palate as far as the second molar; the swelling was confined to the le t side of the middle line. There was a small incision at the root of the left tonsil, from which pus

was exuding. Anterior rhinoscopy disclosed no gross changes in the nose or presence of muco-pus. The left ear was filled with epithelial débris and pus. After cl eansing meatus no perforation could be seen. Patient was quite sensible, and could give a fair account of her illness, and could swallow fairly well. Temperature, 102°.

During the first three or four day the patient remained in the same condition; fair discharge of pus from the incision at the base of the tonsil. The discharge from the had ceased, and the patient had not had earache. Temperature remained high, varying between 100° and 103°.

December 19, 1902: Free discharge of pus from the left nostril when patient blew her nose or when it was syringed.

Four doses of 10 cc. of antistreptococcic serum had been injected since admission without any reaction. The throat was cleaner, and there was no discharge from the ear. The edema of the lids, conjunctiva, and the proptosis was worse. There was complete paralysis of the ocular muscles on both sides; there was also more fulness about the angle of the jaw and molar regions, and the swelling at the root of the nose had increased.

As the patient was growing worse, it was decided to explore under chloroform and give a free exit to pus. An incision was made in the soft palate, or rather, the original incision was extended. A fair amount of pus was let out. Another was made just behind the angle of the jaw, and a quantity of pus at once escaped. A drainage-tube was passed through the soft palate round behind the ramus of the jaw and out through the wound at the angle. The horizontal ramus of the jaw was found to be stripped of periosteum. The ends of the tube were fastened at the angle of the mouth. The swelling on the forehead was also found to contain pus, which was drained.

Although there was a great deal of pus in the nose, one could not trace its origin. The orbits were not explored at this time. The operation had no effect on the temperature on the pulse-rate; patient, however, took her food a little better.

December 24, 1902: There seemed to be more swelling of the lids; the orbits were explored, and pus came from both, more especially the right one. Patient very drowsy, and there was a little pneumonic consolidation at both bases. Temperature, 101°; pulse, 152; respiratson 40.

January 1, 1903: Patient very much worse the last two days; had had convulsions, only conscious at intervals, pus discharging freely from the left nostril and right orbit.

Patient died January 2, 1903.

A post-mortem examination was made twelve hours after death. Dura mater discolored. Superior longitudinal sinus was filled with ante-mortem clot adherent to wall. Dura mater opened, allowing escape of fetid pus. Diffuse purulent lepto-meningitis. Brain was adherent to the dura over the right frontal lobe. Both hemispheres are bathed

in pus, showing advanced encephalitis with necrosis, especially on the left side of the frontal lobes.

The necrotic changes extended along the left Sylvian fissure. In the mid-line the portion of the brain adjacent to the middle-third of the superior longitudinal sinus was similarly affected. The frontal region had the appearance of pus having been poured over a putty model of the brain, which had been indented deeply with the finger-tips. The cortical veins were greatly engorged; the ventricles were empty.

There was a large collection of pus over each orbital palate, extending backward along the base to the anterior margin of the foramen magnum. Not much pus in the middle fossa, posterior fossa free. Left cavernous sinus filled with septic thrombus and pus.

An erosion of the wall of the sinus extended into the cavum sellae of the sphenoid. The septic thrombosis extended forward into the superior and inferior ophthalmic veins. The intercavernous sinuses and the right cavernous sinus and ophthalmic veins were involved. There was a subdural abscess between the basilar plexus and the cantle of the saddle. The bone here was broken down, and a blunt instrument easily passed into the cavum sellae. Permission not having been obtained for a complete autopsy, it was considered inadvisible to attempt to trace the thrombotic process on the left side into the pterygoid plexus and along other venous ramifications. The carotid canals on both sides contained pus. The superior and inferior petrosal and inferior longitudinal sinuses were patent. The lateral sinus contained a septic ante mortem thrombus clot, extending to the torcular Herophili on either side.

The cavity of the sphenoid was exposed from above; it was full of pus. The communication was quite free.

The opening in the left lateral wall, referred to above, had smooth margins, and was about 6 millimeters in diameter. Examination of the opening between the left cavernous sinus and cavum sellae gave no clue as to whether the sepsis had spread from the venous sinus or osseous sinus. If from the venous sinus, then the thrombotic process had extended from the pterygoid region; if from the bony sinus, then the sphenoidal empyema was the original focus, unless the condition had originally been idiopathic.

The drainage into the nose from the sphenoidal cavity was very free.

The eithmoidal and frontal cells were normal. The antra of Highmore were roomy and free from pus. The left contained turbid serum.

The left tympanic cavity was examined through the tegmen tympani, and found to be free from pus. *Per speculum*, the external auditory meatus and the membrana tympani were normal in appearance.

REMARKS.

Macewen* states that a case of primary marasmic thrombosis of the cavernous sinus has never been recorded. In this case the age of the patient and previous history were also against such a supposition. I have recorded elsewhere† a case of idiopathic thrombosis of the lateral sinus, in which the middle ear was absolutely healthy and in which the thrombus, with the consequent passive edema, remained aseptic, death occurring from a non-infective encephalitis. The patient's previous history, and the examination of the nose, orbits, and ears, led us to conclude that the primary mischief was in the pterygoid plexus. If ever again a similar case be encountered, an attempt to surgically treat the cavum sellae, after preliminary removal of the middle turbinal, would be made.

My best thanks are due to Dr. Thomson, the patient's medical attendant, to Dr. C. H. Turner, Senior House-Surgeon, for much valuable assistance in the conduct of the case, and to Mr. Wrathall, the electrician, for the photographs.

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*Macewen: "Pyogenic Disease of the Brain and Special Cord," p. 245.

†The Journal of Laryngology, September, 1900.

XLI.

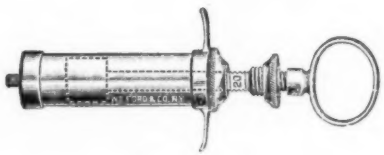
PARAFFIN SUBCUTANEOUSLY INJECTED FOR THE CORRECTION OF EXTERNAL DEFORMITIES. — THE DANGERS TO BE AVOIDED AND THE TECHNIQUE.

By Harmon Smith, M. D.

NEW YORK.

ASST. SURG. MANHATTAN EYE AND EAR HOSPITAL.

Owing to the ease with which paraffin may be injected under the skin; it is carried far beyond the necessities of the case and when the needle is withdrawn, the patient has a Grecian nose upon a German face. Nor is this the only untoward condition likely to arise, as excess of presure is exerted



on the tissues which diminishes the blood supply to that part and is likely to be followed by slough. To obviate such a calamity, it is advised to inject only a portion of what you intend to add finally, and discontinue injecting after observing an anemia of the skin over the deformity. It is far easier to add more paraffin than to remove it after it is once under the tissues.

The next of the evils to be considered is the entrance of paraffin into adjacent tissues not intended for injection. Par-

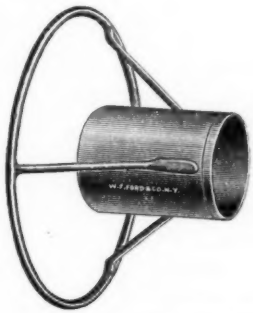
ticularly is this the case in regard to the soft tissues of the orbit, upper and lower eyelids, and over the forehead. I have had several cases referred to me where the paraffin had encircled the orbit, filling in both upper and lower lids. Here it is particularly noticeable, and produces an extremely red and swollen appearance, which is much more objectionable than the original deformity. It can be readily conceived how this may occur in the use of ordinary piston syringes when the paraffin is used hot; but where a screw piston is used and the paraffinis in a solid form, it is beyond my comprehension how anyone can get such a deformity.

It has never been my misfortune to go astray since using the screw-piston syringe. With the administering fingers of an intelligent assistant, one can be accurately informed of the pressure brought against the tissues, and can stop injecting when the assistant admonishes that too much force is being expended against his fingers. There is no mechanical arrangement that can embody the sensibilities of the tactile nerves, and give warning of the danger point.

The third precaution is against surgical uncleanliness. Improperly prepared instruments, field of operation, paraffin or hands of operator is sure to result in abscess, with a possible slough. An oft cited case, which has done great damage to the pursuit of paraffin work, was probably the result of some fault in technique. Although my paraffin is sterilized by a chemist and sealed in tubes ready for use, I invariably boil the same in a sterilizer before using.

The fourth evil, if due to paraffin, is one of serious consideration. There have been two reported cases of embolus of the arteria centralis of the retina. In the last reported case of Hurd's, there was too close a connection between the time of injection and the resultant blindness in one eye for anyone to say abstractly that paraffin was not the cause of the embolus. However, there have been hundreds of injections of paraffin reported, and only two sequelae of this nature, and there is a possibility of this being a coincidence for which paraffin is in no way responsible. The embolus might have been occasioned by an increased arterial pressure brought against some easily detached particle clinging to the intima

of the vessel, and thus found its way to the eye at this time. Yet few medical men are willing to accept these possibilities. Though Hurd used a screw-piston syringe, he used a paraffin largely mixed with white vaseline, and this invariably softens the paraffin and makes it granular. I believe in using a paraffin as nearly pure as is possible to obtain and with a melting point of 110° F. If it is obtainable at a melting point of 110° F. without any other mixture, so much the better. Another element of chance enters into the case, and that is the consistency of parafin. Somtimes an operator is unwilling to wait for the paraffin to harden before injecting, and injects it



when it is semi liquid. In the light of our present experience this should never be done; but one should await the hardening of the substance throughout the cylinder, and then it will be ejected from the needle in a rod like form apparently safe from embolus and yet sufficiently mouldable. Too much time and patience can not be expended in this way, particularly if we wish to feel absolutely safe in making our injections. The injection should be made away from the angular vein, and not toward it. I now make all my injections with the needle pointing toward the tip of the nose, and never upward toward its root. It is sometimes necessary to use a curved needle in order to accomplish this.

The fifth evil is one of neglect in looking carefully

into the general health of the patient. I would never inject into a diabetic or nephritic patient. Slough is imminent in either. Gouty and syphilitic patients are not the most desirab e subjects. In the first we have more or less pain around the injection for some time after, and in the latter considerable edema results, lasting for a week or more. I have never seen other unfavorable symptoms than these, in this class of patients. The redness which sometimes ensues is controlled by ichthyol (20 per cent. solution) applied on cloths during the night. It has been suggested by Cobb of Boston that antiphlogistine and peroxid of hydrogen have similar pleasing results. I have never seen the redness long persistent, even in very delicate women with thin skin. I am unable to state what result would obtain in alcoholics.

TECHNIQUE:—Ordinary surgical technique is all that is to be observed. My routine invariably is as follows:

(1) Scrub field of operation with green soap and water.
(2) Apply alcohol freely.
(3) Wipe off with a bichloride solution of 1 to 5000.
(4) Pour on a little ether.

The syringe and needle are boiled and then allowed to cool sufficiently for easy manipulation, and the hands are surgically c eansed. At the point of entrance of the needle I usually inject three or four minims of a 4 per cent. solution of cocain. Some operators prefer a weaker solution. I have in several instances, injected the paraffin without any anesthetic, and with but slight pain to the patient, and that only upon entrance of the needle. Into a closed tin receptacle I pour the paraffin, after melting, from the test tube, and place this receptacle into a sterilizer or any ordinary boiler; surround it almost entirely with water and boil. After I have boiled it for a few minutes, I remove the paraffin, draw it up into the syringe, which has been sterilized in the same boiler with the paraffin, and when sufficient is withdrawn, I evacuate the air bubbles from the syringe by pressing the piston upward, and run the set screw into placc. Sufficient time is now allowed for the paraffin to assume equal consistency throughout and to cool down to a semi-solid state. This may be expedited by placing the syringe in a bowl of sterilized water at 80° F. Before beginning my injection, I warm

the needle of the syringe in some hot sterilized or even boiling water to soften the paraffin which has formed a hard plug in it, because the screw force exerted thereon may either cause the paraffin to run back of the metal piston, or, as happened in one instance brought to my notice, burst the needle. Should the paraffin come out in little interrupted spurts when the piston rod is revolved, and ifof a too liquid nature, I again cool, warm the needle as before and continue until the paraffin is ejected in a proper state. When this condition is reached, I insert the needle beneath the skin, but above the periosteum, carrying its point slightly beyond the deformity and begin to inject; having the assistant exercise pressure upon the soft tissues at inner canthi and upon the region of soft tissue at the junction of nose and forehead. Supporting the syringe with one hand, I mould and smooth the injected paraffin to the requirements of the case, only injecting small quantities at a time, and exercising the greatest care to prevent injecting too much. In most cases I overcome the deformity at the first injection but it is by no means advocated as a rule. Some of the best results have followed three injections. After the first few minims have been injected, I gradually withdraw the needle, making slight additions to the original quantity, and taking every care to mould and smooth the surface, so as to leave the overlying tissues perfectly even. After withdrawing the needle, I spray the part with ether, which almost immediately hardens the paraffin and insures a better result. The entrance of the needle is sealed with collodion and the patient instructed to apply the ice cloths for twelve to twenty-four hours. When the second injection is necressary, I have the patient return in one week; but where circumstances made earlier attention desirable, I have not hesitated to make it in three days after the first.

44 W. 49th St.

XLII.

TOBACCO NERVE DEAFNESS.*

By Wyatt Wingrave, M. D.

Gentlemen:—Let me first express to you my deep appreciation of the honor which you have conferred upon me. No one can feel the honor and its responsibilities more keenly than I do, and were it not for the confidence in your readiness to make concessions for my deficiencies and to afford me help in difficulties, I should certainly not be able to accept an office so ably and worthily held by my distinguished predecessors.

My next duty is to heartily congratulate our past President upon the unqualified success of the Association during his second year of office, for which his tact, courtesy and kindness are in no small measure responsible. Dr. McIntyre in the regularity of his attendance, in his own natural enthusiasm, and his lavish supply of scientific material, has rendered my position as his successor a most difficult one to occupy.

This being the first society formed in Great Britain for the study of our specialties, I do not think that a critical survey of our collected transactions would afford any disappointment to its founders, and I sincerely trust that its standard of usefulness will not suffer in my year of office. We have now two sister societies whose objects run parallel with our own; their success we most cordially appreciate. They have not supplanted the older relation, but their suceess has only served to emphasize the wisdom of our founders. With regard to our work, there is one point which I cannot overlook—viz.: The great obligation which we in London are under to our Fellows who so conscientiously attend the meetings. We well know their difficulties in presenting cases, consequently we must recognize that it is our

*Presidential Address to the British Laryngological, Rhinological, and Otological Association, January 30, 1903.

duty to relieve them in that respect, knowing that we may confidently rely upon them to furnish us with other material for discussion.

Further, while maintaining a good supply of clinical material, I trust that Morbid Anatomy and Pathology will continue to occupy a prominent position at our meetings, since every facility is afforded by the Council for microscopic and other exhibits.

It has been suggested that three societies are unnecessary, and that they are in the position of having outlived their usefulness. Neither of these views can be endorsed with reference to the British Laryngological, Rhinological and Otological Association. In the first instance, it is not purely Metropolitan, but as its title shows it is essentially British, and it does not confine its work to one particular branch of specialism; moreover, the solid evidence of its vitality is, I think, sufficient answer to the second suggestion. But there is one point which we mnst not lose sight of—viz.: that our meetings are not entirely devoted to the exhibition of clinical cases, but include also the reading of papers and their subsequent discussion. This traditional divisionof our meetings into two portions is an important and distinctive feature of our Society, and will, I trust, continue to meet with your approval.

I must now claim your indulgence for deviating slightly from the orthodox address in substituting a preliminary introduction to a clinical subject, which, I venture to think is one not without interest and importance.

We cannot fail to have observed the rapidly increasing consumption of a drug which is not only beyond all proportion to the increase of population, but promises to extend to a still greater degree; and, further, that its over indulgence (especially by youths) is likely to be responsible for serious morbid changes, some of which are of immediate interest to us in one department of our work. I refer to tobacco. Its responsibility for certain morbid visual changes has been fully established, and, observing the frequent recurrence of deafness in these suffering with tobacco amblyopia, it occurred to me that the Association might be more than coincidental. This prompted a careful examination of such cases,

with results which justify my submitting to you a preliminary communication on the subject.

The relationship between rhinology, otology and ophthalmology has recently been before us in the shape of Dr. C. Ziem's paper* on "Diseases of the Eyes and Nose," and cases were shown by Mr. Mayo Collier and myself illustrating the occurrence of optic neuritis with middle ear disease, so that the field is not a new one to us but embraces another aspect.

Most of the cases now referred to occurred in my hospital practice, some were seen in private, and others were referred to me by my colleagues. With regard to the ocular phenomena, the scotoma cases were verified by specialists in that department.

It will suffice to briefly sketch the main features which were observed. Deafness due to tobacco smoking may be conveniently classified in three groups, according to their etiology: (1) Mechanical or pneumatic. (2.) Irritative or catarrhal. (3) Toxic or nerve deafness.

1. *Mechanical.*—This has its origin in the habit of smoking a tightly-packed pipe, cigar, or cigarette, especially in those suffering with nasal obstruction. A violent minus or negative naso-pharyngeal pr ssure is exerted with each inspiration, not only upon the Eustachian tubes, but also upon the blood and lymph vessels of the parts, so leading to persistent hyperemia, upon the symptoms and treatment of which we need not dwell,

Irritative or Catarrhal.—This form is very familiar in early morning cough and expectoration of habitual smokers. It is caused by the chemical and mechanical irritation of the smoke on the mucous membrane, extending along the Eustachian tube and inducing hypertrophic changes in that canal and its connections.

Toxic or Nerve Deafness.—This is due to the gradual accumulation of certain toxins of tobacco in the system. Whatever the actual poison may be, whether picrotoxin, nicotine, or any other, it is, as a rule, found in largest amount in the darkest, strongest, and cheapest tobaccos, *e. g.*, cut plug,

* Journal of Laryngology, 1901, Vol. XVI., p. 116.

cut cavendish, shag, etc., also in cigars of the Maduro strength, Oriental as well as Occidental. This poison is undoubtedly cumulative, since complete abstinence is essential in effecting any permanent improvement; mere reduction in the quantity consumed or of its strength generally proves unsatisfactory.

The effect of tobacco toxin upon the cardio-vascular system is familiar to all of us, also its influence upon the gastro-intestinal tract, which may be responsible for the production of further toxins.

But its most striking effect is upon the nervous system, as exemplified in "Tobacco Amblyopia" a disease characterized by degeneration of certain bundles of the optic nerve, known as the papillo-macular fibres, constituting scotoma, a condition associated with the loss of appreciation of the visual red waves.

Does the auditory nerve present a similar degeneration? Although at present we have no definite histological evidence, the fact that there was a marked deficiency in the appreciation of low tones in 50 per cent. of the cases recorded is presumptive evidence in favor of there being some selective degeneration at work in the auditory as in the optic nerve.

The effect of the toxins may perhaps be terminal and central, but these are questions which demand careful and extensive observations, both histological and clinical.

The cases which I have examined are seventeen in number. They were those of typical nerve deafness, for which no cause other than tobacco abuse could be found. To save time I give you a brief abstract of their features.

Ages.—With regard to age, eight occurred betwen twenty-four and forty, nine between forty-eight and sixty-four.

Tobacco.—They all smoked very strong tobacco or cigars, and in large quantities.

Deafness.—They were all subjects of nerve deafness; the appreciation of low tones was defective in eight, tinnitus and vertigo being generally well marked.

Vision.—There was marked impairment of color sense—red—in twelve; of these four had well-defined scotoma.

Treatment.—Treatment consisted in complete abstinence

from tobacco in every form, with the administration of strychnia, quinin or bromides.

Results.—Quinin and bromides, separately or combined, afforded no appreciable effect, but strychnia pushed to full doses, proved more succesful. Three severe cases were completely cured in eight, nine, and twelve months, respectively; nine showed marked improvement, two improved only slightly, and two refused to continue treatment.

That the improvement was in a great measure due to arrest of smoking was shown in several cases, which always relapsed on resuming the habit, although the strychnia was continued in. Improvement was again marked on abstaining from tobacco.

In conclusion, allow me to emphasize the following points:

1. That they were all well-marked cases of nerve deafness (unattributable to other causes) occurring in heavy smokers.

2. That the loss of low tones in 50 per cent. suggests an auditory equivalent for a recognized ocular lesion.

3. That the disease was symmetrical.

4. That there was impairment of color sense in eight of them, and definite scotoma in four cases.

5. That 80 per cent. showed marked improvement on abstinence from tobacoo, supplemented by drug treatment; three were cured. But the habit was so strong and the will so weak in the rest that the forecast and the results were not encouraging.

The confirmed smoker is often as tenacious of his habit as the tea-drinker and victims of alcohol, opium, cocain, and other habits.

Although you will doubtless find in these notes many points of weakness and many deficiencies, still I trust I may have presented sufficient evidence to justify my selection of the subject, in view of a more thorough clinical analysis in the near future, and also of eliciting the views of those whose wider experience of scotoma may enable them to speak with greater confidence.

ANALYSIS OF SEVENTEEN CASES OF TOBACCO NERVE DEAFNESS.

1. C. S——, a warehouseman, aged twenty-four, com-

plained of deafness and noises of nine months' duration (right ear). He smoked two ounces of shag weekly. Rinne +. Air C.—12. Bone C.—5. Diminution of low tones. Difficulty in appreciating red. Treatment: Quinin. Result: Marked improvement in four months.

2. Thomas M——, aged fifty, horsekeeper. Deafness both ears, with tinnitus; nine years' duration. Smoked 1 ounce of shag daily. Air C. R.—40; L.—30. B. C.—30;L.—20. Rinne+. Loss of low tones. Color sense: Green appeared blue; red caused much uncertainty. Treatment: Bromides. He would not entirely give up tobacco, but smoked less and of a milder kind. Result: Slight improvement.

3. J. B——, aged thirty-six, a clerk. Complained of deafness and noises; six months' duration. Smoked three ounces of dark Virginia weekly. Meatus and mastoid were both—. Rinne +. Low tones lost. Color sense: Reds dull. Treatment: Strychnia. Result: Improvement in two months.

4. E. P——, aged fifty-four, carpenter. Deafness in left ear: ten years' duration. Had been a very "heavy smoker", but lately had reduced his allowance to $^3/_4$ ounce of shag daily. Meatus—. Mastoid—, Rinne +. Low tones deficient, He was under treatment for scotoma, which, with deafness, improved on giving up tobacco.

5. C. H——, aged fifty-four, laborer. Deafness right ear with noises and giddiness; six months' duration. Smoked $^1/_2$ ounce black cavendish daily. Both meatus—. Both mastoids—. Both Rinne—. Low tones lost. Vision nictalopic: Slight bilateral scotoma; reds appeared brown. Treatment: Quinin and strychnia. Result: No improvement; refused to give up or diminish his tobacco.

6. A. R——, age 40, ostler. Deafness both ears; six years of and off. He volunteered statement that he was always better when he reduced the tobacco. Tobacco reduced during last four months to one-half ounce of shag daily. Meatus, R.—6; L.—4. Mastoid, R.—; L—. Rinne, R.+; L+;. Color sense: for reds almost gone. Well defined scotoma. Was under Mr. Lang at Middlesex Hospital. Treatment: Strychnia. Great improvement,

7. F. K——, aged thirty-four, blacksmith. Deafness in both ears; four years' duration. Smoked $^3/_4$ pound navy

cut weekly. Meatus, R.—12; L.—15; Mastoid, R—6; L.—5. Rinne, R.+; L.+. Color vision: Red appeared as chocolate. Faint scotoma. Treatment: Strychnia. Patient disappeared.

8. J. T——, aged sixty, painter. Deafness; ten years on and off. Smoked half ounce shag daily. Meatus, R.—8; L.—12. Mastoid, R.—4; L.—5. Rinne, R.—, L.+. Color vision: Reds were "dirty," Under treatment at Moorfields for scotoma. Treatment: Strychnia; no tobacco. Result: In four months reported as better.

9. W. M——, aged sixty-four, farmer. Deafness and noises; for four years always smoked 1 ounce shag daily. Meatus, R.—4; L.—7; Mastoid, R.—6; L.—8; Rinne, R. +; L.+. Color sense not recorded. Diminution of low tones. Bromides, no effect. Strychnia afforded slight relief, but great improvement followed complete arrest of tobacco in seven months from commencement of treatment.

10. E. G——, aged fifty-six, park keeper. Deafness four years. Smoked an ounce and a half dark Virginia daily for many years. Meatus, R.—6; L.—2; Mastoid, R.—7; L.—2. Rinne, R.+; L. +. Color sense normal. Low tones weak. Treatment. Strychnia; no tobacco. Result: Cured in twelve months:.

11. H. S——, aged thirty-four, clerk. Deafness and noises; twenty years. Smoked 1/4 pound weekly. Meatus, R.=4; L.—10; Mastoid, R.+6; L.—4. Rinne, R.÷; L.+. Color sense good. Treatment: Tonsillotomy, bromides. No change in two months. Stopped tobacco and put on strychnia. Marked improvement in two months.

12. J. S——, aged twenty-two, clerk. Deafness and noises in both ears. Duration, 18 months. Slight smoker. Meatus, R.—2; L.—8; Mastoid. R.+4; L.—17. Rinne, R.+; L.+. Color vision: "Dirty" red. Treatment: Strychnia; no tobacco; Result: Improved in one month and cured in eight months.

13. T.M——, fifty-three, farmer. Deafness, noises and giddiness. Duration, two years, on and off. Moderate smoker since youth. Meatus, R.—8; L.—20; Mastoid, R.—10; L.—10. Rinne, R.+; L.+. Color sense: Hesitates over reds. Treatment: Strychnia and no tobacco. In three

months all symptoms greatly reduced, except tinnitus. Six months later quite cured.

14. M——, aged thirty, Royal Navy. (Dr. N.) Gradually increasing deafness. Duration, three years. Smoked 3 ounces of black navy cut per week; always a great smoker. Meatus, R.—4: L.—9; Mastoid, R. normal; L. normal. Rinne, R+; L.+. Color sense: Reds were magenta. Treatment: Iron, quinine and strychnia, and no tobacco. Result: Marked improvement in four months.

15. M——, aged forty-eight, waiter. Deafness and noises; ten years. Smoked six cigars daily for many years. Meatus, R.—6; L.—6; Mastoid, R. normal; L, normal. Rinne, R+; L.+. Low tones defective. Color sense: Difficulty with reds. Myopic. Quinin hydobrom, and no tobacco. Result: Marked improvement in three months.

16. M——, aged forty-nine, fitter. (D. G.) Deafness and noises on and off twelve months. Smokes freely. Meatus, R.—8; L.—6; Mastoid, R.—4; L.—5. Rinne, R+; L.+. Color sense: Uncertain. Treatment: Strychnia, no tobacco, and Eustachian catheter for ac. C. M. E. Result: Marked improvement.

17. J. J——, aged forty, barman. Deafness four years. Smoked 3 ounces of navy cut daily. Meatus, R.—10; L.—8; Mastoid, R.—4; L.—6. Rinne, R.+; L.+. Color vision: Uncertain. Treatment: Strychnia and less tobacco. Result: Patient disappeared.

XLIII.

A CASE OF ACUTE OTITIS MEDIA AND SINUS THBOMBOSIS; MASTOIDECTOMY; EXCISION OF INTERNAL JUGULAR VEIN; SEROUS MENINGITIS; EXPLORATOR CRANIOTOMY; DEATH; AUTOPSY.

By Edward Bradford Dench, M. D.,

NEW YORK.

C. A., age eight years, case under my observation at the New York Eye and Ear Infirmary, suffering from an acute inflammation of the right middle ear. When I fir t saw the patient, the disease was of about three days' duration. The boy had been suffering from intense pain in the ear. On examination, I found bulging of the drum membrane, most marked in the posterior portion, and there was some tenderness over the mastoid process, especially at the tip. The upper wall of the canal, close to the drum membrane, was slightly sunken, but not markedly so. The patient walked with his head slightly inclined to the right side, as if the neck was stiff. A free incision was made through the posterior segment of the drum membrane, and the ear was ordered to be irrigated every two hours with a 1-5,000 solution of bichloride of mercury. Two days later the patient reported again. The neck was still stiff, but the incision had given complete relief to the patient for about twenty-four hours. The night before his second visit, however, he had not slept well. The mastoid tenderness was somewhat less than at his previous visit. The ear was discharging very profusely, and the opening through the drum membrane seemed sufficient to ensure free drainage. The child was, therefore, sent home, with orders to continue the irrigation as before. Three days after I again saw him At this time the discharge from the

ear was scanty, the pain had been continuous and severe since the last visit, the neck was more stiff, and there was decided tumefaction below and behind the tip of the mastoid process. The patient was admitted to the hospital, and immediately placed upon the operating table. The mastoid was opened in the typical manner, the antrum being first opened; neither pus nor granulation tissue was found, and the antrum seemed in an absolutely normal condition. On exploring the mastoid tip, considerable pus was found in the tip cells. On opening these cells, the pus within them pulsated, and further exploration showed that this pus was in immediate contact with the outer wall of the sigmoid portion of the lateral sinus. The tip cells were removed and the sinus exposed for the length of about three-quarters of an inch. On incision of the sinus a firm clot was found to occupy its lumen. The curette used in the upward direction removed the clot and free hemorrhage followed. The curette introduced into the sinus, in the direction of the jugular bulb, removed fragments of the thrombus, but no hemorrhage followed the curette. I, therefore, immediately proceeded to excise the internal jugular vein. The vein was removed from a point just below the omohyoid muscle to a point just below the base of the skull. The deep cervical lymphatics were considerably enlarged, and their excision rendered the operation a tedious one. The vein contained fluid blood, but was very narrow at its upper portion, undoubtedly due to the infiltration of the wall of the vein. The incision in the neck was closed by interrupted sutures, the ordinary dressing applied, and the patient put to bed. He did very well, and the dressings were changed upon the third day. The central portion of the wound in the neck had united, but it had broken down both at the upper and lower end of the incision, and there was found to be considerable pus beneath the superficial tissues. Up to that time, the patient's temperature had ranged between 99° and 103° and the pulse between 50 and 120. The child had seemed perfectly bright, had answered questions intelligently, and had complained of no pain. The dressing was changed again on the next day and the child appeared to be doing well. On the following morning, the child appeared to be stupid, and the temperature was slightly elevated; the pulse, how-

ever, became steadily slower; in the morning it was 62, at noon it was 72, and when I examined him in the afternoon it was only 42. At the time of my examination, the patient was somewhat dull, but responded readily to questions. He named objects shown him, and recognized members of his family and the attendants, although his answers were slow and he seemed somewhat dull. An examination of the eyes at this time revealed a beginning optic neuritis upon both sides, slightly more marked in the right eye. The field of vision was normal in both eyes and there was no impairment of motion of either eyeball. I might say here that the eyes had been examined immediately after the primary operation, and the discs had been found to be perfectly normal in both eyes. Another symptom which the patient presented was a condition of catalepsy. This cataleptic state involved both the upper and lower extremities; both arms and both legs being raised in any position, they were held in this position by the patient for a considerable period of time; in fact, they remained in the position placed indefinitely. Owing to the slow pulse, and the optic neuritis and the cataleptic condition, I felt convinced that there was some increased intracranial pressure. From the involvement of the parts found at the primary operation, it seemed possible that there might be an abscess of the cerebellum, although, from the short duration of the inflammation, this seemed rather improbable. It was rendered more improbable from the fact that there had been no nausea or vomiting, no disturbance of equilibrium, as far as we could determine, and no nystagmus.

The patient was placed upon the operating table and an incision was made at right angles from the centre of the original mastoid incision, backward, for about two inches. The cerebellar dura was rapidly exposed behind and below the lateral sinus. The dura in this region was deeply injected and congested. A dural flap was then turned down and the cerebellum immediately bulged into the wound. The knife was passed deeply into the cerebellum in several directions, but no pus was evacuated, although the brain tissue seemed exceedingly soft, and what might be termed "liquefied brain tissue" exuded from the margins of the incision. The deeper incision of the knife was followed by the gush of clear serum,

and I at once appreciated the fact that the incision had entered the fourth ventricle. This serous fluid confirmed the diagnosis of serous meningitis. A light packing was introduced between the margins of the incision of the cerebellum, care being taken not to carry this strip of gauze deeply. The exposed cerebellar area was covered with sterile gauze, the posterior angle of the wound sutured, the ordinary dressing applied, and the patient returned to bed. It is hardly necessary to say that throughout the operation great care was taken to prevent infection of the operative field through the wound in the neck or from the exposed sinus, these regions being carefully covered by pads of sterile gauze, held by assistants, so as to maintain a thoroughly aseptic field of operation. The next day the patient seemed decidedly brighter, and the pulse was about 100. There was a free exudation of serum from the incision in the cerebellum; this discharge was so profuse that all the dressings were saturated. From this time on the dressings were changed every day. At the first dressing a large hernia cerebelli was found consisting mainly of granulation tissue and blood clot, with some brain tissue; portions of this were removed at each dressing. For eight days after the operation the patient continued to improve. On about the fourth day after the operation he seemed slightly dull, and took his nourishment with some difficulty. In twenty-four hours, however, this difficulty had passed away, and the child seemed to be doing well, as I have said, on the eighth day after the operation. The hernia, however, still remained large, and portions of the mass were removed at each dressing. The wound in the neck resulting from the removal of the jugular, gradually became healthy; there was no breaking down of the wound, excepting of the upper and lower extremities before mentioned, and the pus discharge from this was very slight at this time. On the ninth day, after the second operation, the patient seemed remarkably well; he appeared brighter, took his nourishment well, the pulse was fair in quality, and he seemed in every way better. Early on the morning of the tenth day, after the second operation, the child suddenly went into collapse, the breathing became rapid, and he died early in the afternoon of the tenth day.

For the pathological report of this case I am deeply indebted to my friend and colleague, Dr. George S. Dixon, and it is with his collaboration that the following portion of the paper is written. The aural pus showed the presence of pneumococci, and the clot taken from the sinus at the time of the operation, showed the presence of a diplococcus and of an unidentified bacillus. Dr. Dixon is inclined to believe that the diplococcus found in the sinus was a pneumococcus, identical with that found in the aural pus.

The report of the autopsy is as follows:

External examination.—Both pupils dilated, the right slightly more than the left. A hernia protuded from the mastoid wound on the right side. The operative wound along the inner border of the sterno mastoid muscle was healed in the middle, but open at both ends; very little pus was present.

Examination of the cranial cavity.—A moderate serous leptomeningitis was present. A small amount of plastic lymph was found along the left side of the longitudinal fissure. Within the longitudinal fissure was normal on both sides. There were adhesions about the mastoid wound and also about the foramen magnum. A clot of considerable size was found attached to the extreme upper end of the cord posteriorly, and extending into the vetebral canal. It had the appearance of membrane carrying extravasated blood. At least two-thirds of the right cerebellar lobe was destroyed. A blood clot estimated as two inches long, one inch wide and from a third to a quarter inch thick, was found in the cerebellar fossa, which was probably post-mortem. All portions of the base of the skull were normal, the right mastoid region of course excepted; the ventricles were normal, except the fourth. The only abnormality here was an opening, about the size and shape of the end of an ordinary grooved director, through the lower part of the wall on the right side.

The hernia was composed mainly of red and white (polynuclear) blood cells held together by fibrin and necrotic cerebellar tissue; the surface presented in sections, numerous diplococci and a bacillus, both organisms apparently being the same as those found in the specimen of the sinus submitted for examination. The diplococci found in the sec-

tions were probably pneumococci, as the aural pus presented this germ on previous examination. The membranous-looking mass passing into the posterior portion of the vertebral canal, proved to be a clot, carrying a large number of leucocytes; no germs were found in it.

The cause of death was undoubtedly hemorrhage into the spinal canal. A further examination of the cerebellum showed that the cerebellar tissue adjacent to the broken down or hernial tissue, presented an infiltration of leucocytes in layers or striae for a short distance inward. There were no broken down areas or evidences of deposits of pus, such as would occur in a pure encephalitis, in the deeper portion of the cerebellar lobe below the base of the hernia.

The infiltration, mentioned above, in the deep cerebellar tissue, occurred in that portion of the cerebellum which lay very close to the infected sinus. It seems probable, from a clinical point of view, that this infection spread through the wall of the sinus and attacked the deeper cerebellar tissue, and that later a more extensive infiltration of the cerebellar lobe occurred, giving rise to pressure symptoms, which necessitated the second operation. On incising the cerebellum, it will be remembered that the tissue seemed exceedingly soft, and that broken down tissue exuded from between the edges of the incision. It seems more than probable, therefore, that the infection spreading in the deeper portion of the cerebellum was responsible for this softening; and that this infection not only spread to the cerebellar tissue, but also to the ependyma, giving rise to the serous collection found in the ventricle at the time of the operation. This edematous condition of the cerebellum would account for the increased pressure in the cerebellar fossa, and the extensive hernia cerebelli. The fact that the germs found on the surface of the cerebellar hernia were identical with those found in the aural pus, at the time of the first examination, would seem to show that the infection had extended directly from within outward, in the manner described. As the patient was doing well until a few hours before death, it seems evident that the rupture of some large vein at the base of the cerebellum was responsible for the death. Had this accident not occurred, it seems more than probable that the patient would have recovered completely.

The case is of interest not only from a pathological, but also from a clinical point of view. We have ordinarily been taught to believe that the fourth ventricle could hardly be entered with safety. In this case the fourth ventricle was opened, and yet the patient survived the operation more than a week; that the cause of death was in no way connected with the opening in the fourth ventricle, the autopsy clearly proved.

I have previously reported a single case in which the fourth ventricle was opened during an exploration of the cerebellum, and in this case also, although the patient lived a number of days after the operation, there was absolutely no inflammation of the lining membrane of the ventricle.

XLIV.

IMPRESSIONS OF THE EFFICIENCY OF PROFESSOR DUNBAR'S ANTITOXIN IN HAY FEVER.*

By Sir Felix Semon, C.V.O., M.D., F.R.C.P.

PHYSICIAN EXTRAORDINARY TO HIS MAJESTY THE KING.

Two causes have combined to retard the appearance of the following paper. In the first place, the weather has been so abnormally cold this year in and around London during the first part of the hay fever season proper that the affection not only made its appearance a good deal later than in ordinary years, but also that the attacks when arising in very many cases were of an abortive nature, that is, that patients who had had the usual warnings of the approach of their enemy, such as itching and irritation of the eyes, sneezing fits, obstruction of the nose, wheezing and actual asthma on one day, and who fully expected that they were in for the annual attack, were pleasantly surprised to find next morning that all the symptoms had gone. It is obvious that trying the antitoxin under such conditions would very likely have led one to form very erroneous conclusions, inasmuch as the effects which one might have attributed to the action of the remedy would in reality have been due to the abnormally wet and cold weather, which prevented the pollen from penetrating into the eyes and nose of those predisposed to hay fever.

Secondly, an even more powerful factor militated against the earlier appearance of this report, namely, the really enormous difficulty of arriving at reliable conclusions with regard to the effects of the new remedy. I do not exaggerate when I say that I have never in any scientific inquiry in which I have been engaged found such difficulties in satisfying my own mind concerning what I ought to report as in this question. After the results of the experiments with Professor

*From the British Medical Journal, July 18, 1903.

Dunbar's toxin and antitoxin, which I published in the British Medical Journal of March 28, of this year, I was quite prepared to find that the effect of the new remedy would be variable in intensity in different hay fever patients, but the differences which I have actually found are so great that it is a matter of extreme difficulty for a conscientious observer to briefly summarize the effects of the new remedy. Not only do different people react surprisingly differently but also in one and the same person the effects of the remedy in some instances vary from day to day without a satisfactory explanation of these differences being forthcoming. This is, perhaps, not much to be wondered at, seeing the capricious nature of the disease itself and its ever vary ing intensity not only in different cases, but in one and the same case, according to external circumstances. All the same, it is not a satisfactory state of matters, and I have, therefore, preferred to speak in the title of my communication of "impressions" rather than of results obtained' because it is quite possib e that further experiences may considerably modify in a more favorable or in the opposite sense, the views I have so far formed. Anyhow, I thought it right to state now what I think of the antitoxin treatment in order that it may be tried on a larger scale.

The following remarks are based upon observations on eight hay fever patients whom I have personally treated, since the conditions of the weather have become normal enough to make it permissible to draw conclusions from the use of the remedy. In all these cases I have carried out the treatment personally, and not placed, until a few days ago, the remedy into the hands of the patients themselves for the following reason: Previous to the commencement of the season I inquired from Professor Dunbar and Dr. Prausnitz whether one ought not to try to ward off the attack altogether by subcutaneous injections of the antitoxin. Dr. Prausnitz dissuaded me from carrying this idea into effect by stating that this experiment had already been made in Hamburg with the result that in some people predisposed to hay fever, subcutaneous injection of the antitoxin had been followed by a swelling of the arm into which the injection had been made, lasting for several days, and accompanied by

erythema and urticara. This statement has quite recently been publicly corroborated by Professor Dunbar himself in a paper which he read before the Medical Society of Hamburg and which has been published in the Berliner klinische Wochenschrift, of June 15th, 22nd and 29th. In this pape he states verbatim on page 597:

"Although the hay fever antitoxin when applied subcutaneously produces no symptoms whatever in normal individuals, so far as our present investigations go, it yields when hypodermically used in hay fever patients irritative phenomena which have rather disagreeable effects. If, for instance, the antitoxin is injected into the forearm, a swelling arises starting from the spot where the injection was made, which may extend over the whole forearm, accompanied by a sensation of heat, redness of the skin and disagreeable itching. These phenomena might last up to six days. It appears, however, as if a sort of immunity against these phenomena developed up to a certain degree when the serum has been applied hypodermically several times. It would also appear as if these phenomena did not arise in all hay fever patients."

From Dr. Prausnitz's communication it was obvious to me that the antitoxin as at present used must still contain certain toxic or septic properties, which cause the disagreeable symptoms described when the remedy is injected under the skin. That Professor Dunbar himself shares this view appears from the following paragraph in the paper to which I have just referred:

"It must by no means be concluded that we may not succeed later on in freeing the antitoxic serum from these properties which give rise to the production of the by-effects described. It could be shown that whilst the power of the antitoxin increased, the by-effects not only did not rise proportionately, but rather diminished. From this I think I may conclude that the by-effects have no relationship to the specific antitoxic substance, and that by removing these bodies the efficiency of the serum will not be interferred with."

However that may be, it seems certain that at the present moment the antitoxic serum is not quite free from toxic prop-

erties, and it was only natural to deduce that, although resorption of these toxic substances would naturally take place more rapidly and intensely from hypodermic injection, similar, although less violent, effects might be produced if the remedy were frequently administered direct to the affected parts. Certain experiences made in hay fever with long continued applications of cocain lent weight to this view, and it seemed only right that the remedy ought to be placed into the hands of laymen before sufficient experiences had been collected showing that no danger was to be apprehended from resorption of the antitoxin from mucous membranes. This was the reason why I protested in my "Disclaimer" of May 23rd against the premature sale of the r.medy and why up to the last few days I have made all applications of the antitoxin personally.

Having, however, so far met with no untoward by-effects of any kind in my limited experience I think that reasonab e patients may be trusted with the self-administration of the antitoxin, provided always that they are warned against over-using the remedy, inasmuch as under such circumstances I even now consider it by no means impossible that ultimately disagreeable by-effects similar to those observed after subcutaneus injection of the remedy may develop. In my trials I have partly used preparations of the 1 in 500 antitoxin, with equal quantities of normal horse serum, which I mixed myself, th antitoxin and serum having been kindly sent to me by Professor Dunbar, partly with the ready-made preparation, to which the name of "pollantin" has been given. As sent out by the manufacturers, the remedy is put up in a small case containing two wooden boxes, one of which incloses a phial with the serum, and the other an empty glass provided with a drop pipette, with the following directions:

"As the serum would soon become contaminated by frequent contact with the pipette, it is advisable to pour out one-third of the contents of the serum phial into the empty glass provided with a drop pipette. This glass is effectually closed by pressing the india rubber cap of the pipette into it, but care should be taken to keep this glass upright so as to avoid the liquid flowing into the cap. Patients should not fail to carry a small quantity of serum in this glass about with them

whenever they may expect a hay fever attack. Immediately after noticing the first symptoms of irritation in nose or eye, a drop or two of the serum should be instilled upon the eye or into the nose affected.

"The serum can be applied to the eye in the following manner: After sucking up a few drops into the pipette, exert a gentle pressure on the rubber cap until one drop just emerges from the opening of the pipette; then before a mirror carefully approach the pipette to the outer corner of the eyelid, when the drop is sucked up by the eyelashes, and spreads over the conjunctival membrane. By the aid of a pocke mirror the same manipulation can easily be carried out in the open air.

"In order to instil the serum in the nasal cavity, fill the pipette with 3 or 4 drops of serum, and, bending your head backward, insert the pipette about ½ in. into the nostril affected, and empty it by a short pressure on the rubber cap. A few sniffs suffice to spread the serum over the mucous membrane."

The phial containing the serum is closed by a cork, and I here wish to express an earnest hope that the manufacturers may see their way to provide better corks. As it is, I have found that in the majority of cases the cork, which usually is unnecessarily deeply rammed down into the phial, breaks off, however carefully one may attempt to remove it and that endeavors to subsequently extract the remaining larger part of the cork often results in breakage of the upper part of the tube. Seeing the very high price of the remedy—the apparatus above described costs 10s.—it might surely be expected that only the best sort of cork, or, better still, rubber plugs, should be used, or that some more commodious and less fragile form of preserving the serum should be devised. Furthermore, the drop pipette is rather short when the rubber cap is applied for the sucking up of every drop of the precious fluid, a quantity of which is thus apt to be lost each time the remedy is used. Again the glass bottles not rarely stick fast in their wooden enclosures and cannot be removed. Altogether the technical question is far from having been solved in an ideal matter.

As to the application itself, I have in each case strictly

followed the directions given in the printed slip enclosed in the box containing the remedy. In a number or cases the application was made once daily, in others twice, whilst in two cases it was used as often as three times a day.

I may summarize the impressions I have received by saying that, as one would have anticipated from the nature of the affection itself in which unfortunately during the critical time almost constant reinfection takes p'ace, and from the results of the experiments described in my previous communication, that the remedy in its present form of application is not curative, that is, that one must not expect that a single application will ward off or cure the disease for any prolonged period. Whether with greater perfection of the serum and abolition of the unpleasant by-effects caused by hypodermic injection that great desideratum will ever be accomplished remains to be seen. Certain it is that at present the serum does not possess that power.

It would, however, certainly be a great enough gain if, by repeated application to the eyes and nostrils, the occurrence of an attack could with cetainty be prevented for a limited period, and a fully established attack be cut short or rendered less unpleasant. I may at once say that in several of my cases installation of one drop of serum into each eye and two drops into each nostril appears, indeed, to have had the effect of warding off an attack, which otherwise, according to the considerable experience of these patients, would have almost certainly have occurred, for a period of several hours, four to five on the average. In two of my cases this effect was so marked that auto-suggestion seemed to be practically out of the question. Unfortunately, however, even in these cases, this happy effect did not invariably occur, the remedy failing, for some unexplained reason, on individual occasions. Whether in these instances the failure was due to the fact that besides the pollen infection, the nervous temperament of those predisposed certainly plays a great role in the production of an attack, and that, for some reason or other on these particular occasions, the nervous element overwhelmed the effects of the antitoxin, I must leave an open question. The fact remains that in none of my cases could the effect of the application of the remedy be reckoned upon as a cer-

tainty. In other cases the effects were much less marked. In one or two itching of the eyes, sneezing fits, running of watery fluid from the nose, etc., recommended very shortly after the application of the remedy, and in the one case amongst my eight patients in which asthma played a predominant and very disagreeable role this was not affected at all by repeated use of the remedy. The facts above stated will perhaps become more apparent from the reports of some of the patients which I append at the end of my paper.

With regard to the cutting short of fully established attacks, I cannot say that I have observad any marked effects, with the exception that so far as the irritation of the eyes is concerned all my eight patients immediately after application of the remedy experienced a sense of relief, the duration of which was, however, very variable.

To sum up: I can unfortunately not say that the remedy has in any sense acted as a panacea in any of my cases. It has given relief in some, and appears to have acted beneficially certainly in postponing the occurrence of the attack in others of my patients. Possibly these effects might have been even more marked had the applications been made with even greater frequency. I ought also to say here that according to the spontaneous statements of at least two of my patients it appears to have had the effect of making the present hay fever period altogether a good deal more tolerable than on previous occasions.

The main applicability of the serum would ceriainly seem to be in the direction of its postponing for several hours the occurrence of the regular attack. If further experiences should show that prolonged and frequent application neither diminishes its efficiency nor causes unpleasant by-effects even the limited results above described will have not inconsiderably added to our therapeutic power of combating this troublesome affection; but whether this will be so I do not dare to say at present. I am quite willing to modify my impressions with furthermore extensive experience. The statements made in this paper, however, represent the impressions I have so far gained.

APPENDIX.

DR. L. O.

June 29th, 1903.—11. a. m. Serum introduced into both nostrils, and a drop placed on carunculae.

11.30 a. m. Secretion started from right nostril and continued until

12.30 a. m., when patient had a bad attack.

2 p. m. Attack had passed off, and patient was quite free until

5 p. m., when an acute attack started, and got gradually worse until 11 p. m. accompanied by acute conjunctivitis for the six hours.

The nostrils were very stuffy all night.

June 30th.—Much better in the early morning and until 11.40 a. m. Serum introduced.

11.40 a m. Slight attack, after which patient was quite free until 5.30 p. m. when an attack came on.

7.30 p. m. Serum again introduced; quite free from attack until

11.30 p. m. Slight attack, again free until

July 1st, 3.45 a. m—Slight attack; nostrils seemed completely closed, as they always are at night during the hay fever season, and usually slight asthma in addition.

10 a. m. Slight attack.

11 a. m. Serum again used.

4 p. m. Slight attack, which continued on and off until 7 p. m,

7 p. m. Used antitoxin with immediate relief. This is the first time that patient has found the antitoxin to be successful immediately.

July 2nd.—Three or four slight attacks during the day.

8 p. m. Antitoxin.

10 p. m, Slight attack.

11.15 p. m. Antitoxin. Much better night, and did not awake up until early in the morning of July 3rd with the stuffy feeling in the nostrils as usual after sleeping during hay ver season.

7.45 a. m. Usual morning attack.

7.50 a. m. Antitoxin. Complete immediate relief from conjunctival irritation.

9.45 a. m. Attack severe, nasal discharge copious, conjunctival irritation very severe. Very little relief from antitoxin as had very little left to experiment with.

10.45 a. m. Attack still continuing. No antitoxin.

4.45 p. m. Another attack.

6. p. m. Attack very severe.

7. p. m. Worse.

11 45 p. m. Slight attack. No attack between 7.30 p. m. and 11.45 p. m. Good night. No attack took place until

July 4th.—8 a. m. Attack lasting for half an hour.

9.30 a. m. Another attack fairly severe.

10.30 a. m. Attack still continuing.

11 a. m. Nearly stopped, with the exception of slight nasal discharge from both nostrils.

The patient sums up the results in his case by saying thet the antitoxin diminishes the frequency and duration of the attacks, and is most useful if one assists by staying in the house, and not venturing more than is quite necessary into ths sun. He also emphasizes the fact that the attacks increased in severity when he had no more antitoxin.

B. H.

June 16th.—Antitoxin instilled into eyes in the afternoon. Immediate soothing, though not very pronounced, effect was experienced. Forty-five minutes later, itching in nose, and sneezing again occurred. Hay fever symptoms all the even ing quite as severe as usual.

June 17th.—Eyes and nose considerably inflamed. On going out itching in nose and eyes and inclination to sneeze.

10.50 a.m. Antitoxin applied to eyes and nose. Immediate feeling of relief, cessation of itching, condition of eyes and nose improved for about an hour.

12.30 p. m. Slight return of symptoms, growing gradually worse, as the patient traveled home into the country by train. Great discomfort, which subsided after three or four hours indoors. Patient felt much more perceptible feeling of relief after the application to-day than he had on the previous day.

June 20th.—6 p. m. Antitoxin applied to the eyes. Some

feeling of relief as on previous occasions, and eyes steadily improved for two hours not itching at all during the evening, which was, however, cool and damp.

June 23rd,—Antitoxin applied to eyes and nose. Relief felt, but only for about twenty-five minutes, when sneezing, etc., returned. Worse during the evening, with eyes and nose running freely, and a good deal of tightness on the chest.

After prophylactic injection in the mornings of June 27th and 28th, remaining practically quite free from symptoms on both days, although the patient is quite certain that he would otherwise have suffered very badly.

Miss C.

June 22nd.—1 p. m. Antitoxin dropped into both eyes and nostrils. Right eye stopped irritating, but not much improvement otherwise.

4.15 p. m, Bad sneezing fit, partial obstruction of nose, headache.

7.15 p. m. Bad sneezing fit. Irritation in right eye, complete or partial obstruction of nose, etc., with sneezing fits continue all the evening. The left eye which had been free during the day from irritation, starts intense irritation at 11 o'clock. Asthma during the night.

June 23rd.—7.30 a. m. Bad sneezing fit. Eyes irritating. Head aching.

11.30 a. m. One drop of antitoxin into both eyes and left nostril and two drops into right nostril. After twenty-five minutes no improvement whatever has resulted. The eyes are still irritating and itching, the right nostril is completely occluded. Patient has severe occipital headache. Feels during the rest of the day very ill with asthma, violent headache, varying obstruction of nostrils, coughing fit, etc., although both eyes stopped irritating from 12.30 to 7 30.

June 24.—Antitoxin applied to eyes and nose during the forenoon. Shortly after the eyes cease irritating right nostril becomes free, left remains obstructed. This continues till 6.30 p. m., when all the symptoms more or less return, and continue all the evening, except that the right nostril remains free whilst the left is the whole time obstructed. There is a great deal of asthma and sneezing.

June 25th.—12.30 p. m. Two drops of antitoxin into each eye, and two into right, two into right nostril; none in left.

1 p. m. Left eye ceases irritating. Right nostril still stopped up completely.

1.30. Right eye ceases irritating.

2 p. m. Right nostril free. Left, into which no antitoxin was introduced, stopped up. This continues so all afternoon.

7 p. m. Return of sneezing; eye irritation, nostrils remain the same. Sneezing, irritation, asthma through the evening, and early morning, when, however, at 8a. m., June 26th, the left nostril is free and the right stopped up.

June 26th —One drop of antitoxin in each eye and each nostril, but with the exception that the eyes are free from irritation for a short time not much relief is experienced on this day, there being sneezing fits every half hour, perpetual eye irritation, asthma, etc., these symptoms being also present early next morning.

June 27th.—12 a. m. One drop of antitoxin into each eye and each nostril. No improvement till 3 p. m., after which the patient is quite free from symptoms until 7 p. m. From 7.10 p. m. the symptoms are again present with asthma superadded later on.

Sunday, June 28th.—No antitoxin. Symptoms present all day.

Miss R.

June 23rd, 1903.—3 p. m. General feeling of feverish discomfort. Stuffy and heavy feeling in head, but no acute irritation in eyes or nose. Sore throat and chest.

3.30 p. m. Injection of antitoxin in both eyes and both nostrils. No immediate results took place.

4 p. m. Sneezed three times.

4.20. Violent sneezing fit, lasting quite five minutes, and sneezing the whole time. The heaviness and general discomfort did not abate at all during the evening, but the eyes remained free from irritation, and the soreness of throat and chest seemed to pass away. Constant watery discharge from the nostrils continued, with an occasional sneeze.

June 24th.—5.45 p. m. Instilled one drop of antitoxin into each nostril.

6 p. m. Sneezing. Gradually the nostrils became more comfortable, the discharge and sneezing stopped, and patient remained throughout the following day, the 25th, unusually free from symptoms in spite of being out a great deal in sun and heat, and of its being a typical hay fever day. No irritation in eyes experienced since application of antitoxin on the 23rd.

June 26th.—Extreme irritation in both nostrils, sneezing and discharge. General feverish, wretched feeling.

10.45 a. m. One drop into each nostril. No effect for half an hour then a gradual but very decided improvement took place both in local and general condition.

June 27th.—3 p. m. Prophylactic instillation of two drops into each nostril before going out. Great discomfort all afternoon and evening, all the symptoms being more or less present and very marked.

June 28th.—Very uncomfortable day in spite of remaining indoors. No injection made till 6 p. m., previous to going out. Slight symptoms present all the evening.

June 29th.—8.30 a. m. Two drops into each nostril. Remained comparatively free all morning. Very bad afternoon.

This patient sums up the results of the remedy in her case by saying that on the one day when the remedy was used three times considerable relief was obtained, there being almost complete absence of symptoms. On other days when the remedy was used less frequently the effect was variable, on one or two occasions relief being experienced, whilst on at least two occasions the remedy completely failed. The eyes were, however, always relieved.

XLV.

ETIOLOGY AND SPECIFIC THERAPY OF HAY FEVER.*

By Prof. Dunbar.

TRANSLATED BY OTTO JOACHIM, M. D., NEW ORLEANS.

Through the kind invitation of the President, I am able to present the report on the investigation of hay fever, which Dr. Thost and the author have already announced, at this meeting, which is the last scientific session before the hay-fever season. This is highly appreciated as it is intended to consider conditions which can be demonstrated successfully and free from objections only in seasons free from hay fever.

The historical development of our knowledge of the nature and cause of hay fever needs but brief reference in Hamburg where Drs. Fink, Ferber, Thost and others have published valuable contributions and where this condition has been a subject of study for many years. The publications of Dr. John Bostock, of London, in 1819, made the knowledge of hay fever a matter of common property in the medical world. The symptoms of hay fever, which Dr. Bostock fully, correctly and comprehensively described, will be the subject of Dr. Thost's paper. It is only necessary to state that hay fever in Hamburg and its surrounding districts begins about the end of May or the beginning of June, and affects certain persons regularly every year with a tickling, itching and burning sensation of the mucous membranes of the eyes and nose lasting six to eight weeks and frequently complicated with asthma and the other accompanying corresponding conditions.

Whether hay fever existed before Bostock's publication is difficult to decide. Some authors hold that this disease

*Read before the Med. Society of Hamburg, May 19, 1003. —Berl. Klin. Wochenschrift, 1903, Nos. 24, 25, 26.

first appeared about the middle of the eighteenth century, while others believe that they find evidence in literature that hay fever existed already 400 years ago. It may be assumed as certain that hay fever was in Bostock's time quite prevalent, as the correctness of his observations was at once confirmed from many sources.

Almost all contemporaneous authors agree that hay fever is possible only when two factors combine—that of a certain existing agent with a person predisposed to it. It is intended to furnish hereafter proofs of the existence of a hay-fever diathesis. The percentage of people predisposed to hay fever is very small compared to the whole number, but their total nevertheless must be quite large. A general estimate of 100,000 has been given. It is probable that several times this number is nearer correct. Hay fever prevails in the United States and England more so than elsewhere. The number of hay fever patients in Germany seems to be quite considerable, while in other countries it is said it exists rarely, or not at all. Whether this fact is accounted for by a racial disposition or by greater abundance of the existing agent of hay fever, in the United States, England and Germany than in other countries, is a question at present not pertinent.

The nature of hay fever has at different times been explained in different ways. Bostock, Phoebus and other investigators regarded the first hot period of the summer as the existing agent; Helmholtz regarded hay fever as a disease due to bacteria; other observers attributed hay fever to odoriferous substances or other emanations of grasses and hay. Elliotson was the first to attribute the disease to plant pollen.

Blakely agreed with this view, and substantiated it through investigations of a great number of plants.

Blakely arrived at the conviction that every variety of pollen acts as exciting cause for hay fever and left the possibility open that other causes may also produce the disease. These views were generally accepted as correct until within the last ten years some contrary opinions were propounded. Of late a number of authors have reverted to the views held by Helmholtz and contended that hay fever was a disease due to bacteria. Other authors returned to the theory that odor-

ifero us substances or etherial oils which emanate from flowering plants were the exciting agents in the production of hay fever.

In reporting the following personal observations it is proper to say that until recent years it was the author's opinion that those were right who held microorganisms to be the cause of hay fever, yet these later investigations are considered to demonstrate positively that hay fever is a disease not due to bacteria. The author's observations on bacterial findings in hay fever furnish an illustration of another instance which shows that the continuous, exclusive and abundant presence of certain bacteria is of itself no certain basis for attributing to them an etiological importance for the disease under investigation. It is possible that the bacteria which were observed, found extremely favorable conditions for their development in the secreted mucus of the body temperature. The question as to whether hayfever is an infectious disease or not was solved by alternating exposure to the cause during the time of prevailing hay fever, which in this part of the country according to common observation is found to be universally distributed in the air on dry and sunny days—and immediate withdrawal from the supposed hurtful influences of exposure. The prompt subsidance of the symptoms of irritation produced by exposure to air when by suitable means the admission of air was prevented seemed of importance. If by shutting out fresh air the symptoms subsided, a bacterial cause in the nature of an infectious disease could be excluded. Hay fever attacks appear quickly and with certainty as all hay fever patients know when riding on a railroad train. Experiments, as those above indicated, can readily be made on trains when the opportunity is afforded, as it is in compartment oars, to open and close the windows at will. The observation was repeatedly made on such occasions that the attacks of hay fever subsided, when entrance of fresh air was prevented by closing of the windows, and broak out anew when the windows were opened. It is important to state that the disposition to attack varies considerably even in the same individual at various times of the day. Attacks which have for instance been excited in the afternoon and have subsided by night, may

again reappear in the early morning hour, without renewed exposure to the exciting agent. These observations confirmed the supposition that hay fever was not an infectious disease and that the theory of a living excitent, susceptible of multiplication within the body of the hay fever patient could not be entertained.

Observations of the last few years led back to the supposition that flowering grasses had a causative relation to hay fever. It was early evident that clearness as to the etiology of hay fever in view of contradictory opinions expressed in hundreds of publications could only be obtained if it were possible to isolate the exiting agent, pure and separated from foreign elements, and capable of exciting all the symptoms of hay fever, irrespective of temperature and conditions of weather and in other than the hay fever seasons; it was thought to be necessary further to demonstrate that this exitant was only active on persons susceptible to hay fever and innocuous to other persons, even if used in excessive dosage. If grasses are cut when their growth has so far progressed as to show the first beginning of flowering and set in a container with water in a sunny place, they will continue their development quickly and fully. When the plants are gently touched they will shed a yellow fine powder, which microscopic examination shows to be composed of pure pollen. These should be collected in sterile glass jars held under them and it is possible to obtain them at times free from bacteria. When some of this pollen, collected in the way suggested, is brought in contact with the conjunctiva or nasal mucous membrane or any other mucous membrane of a hay fever patient, an itching, tickling and burning sensation will be complained of within five minutes in the infected locality, followed by an evident vascular injection, swelling and excessive secretion. Some exceptions to this rule will be referred to later. These pollen granules can be easily preserved and kept indefinitively in a desicator, if spread in a thin layer in sterile flat glass jars in their full activity and productive of the above described reactions in hay fever patient at all times of the year.

Having established these facts, it was necessary to learn if hay fever patients would show a greater sensitivenes

than normal persons to other foreign bodies, or if it was only the pollen of the gramineae were productive of hay fever attacks, or if possibly the pollen of other plants as well were capable of producing such attacks, or i it was only the pollen of certain varieties of grasses or if all grasses contained the active agent causing hay fever reactions in persons susceptible to the disease.

Until recently it has been impossible to find other substances besides the pollen of the gramineae, which were productive of reactive irritation in hay fever patients and entirely inert when used on all other persons. Experiments with soot, dust and various other substances have been made with negative result.

The pollen of 50 different plants not belonging to the gramineae were unable to produce reactive symptoms in hay fever patients. On the other hand, all of the 25 varieties of grass pollen examined up to this time produced active symptoms on hay fever patients. Besides, the grasses belonging to the family of grammineae, the ried grasses, which are closely allied to the gramineae, possess active pollen. It would, therefore, be more correct to say that not only all the gramineae, but all the grasses examined, had pollen productive of active reactions on hay fever patients. Besides the grasses examined which had active pollen, the pollen of rye, barley, wheat, corn, rice and many other varieties, mentioned in a previous publication, proved capable of producing reactive irritation in hay fever patients. The nature of the reaction produced by the pollen of the different grasses examined was altogether identical' though considerable difference in the intensity of reaction was noticeable in different varieties of grasses. Twenty-five hay fever patients have so far been examined with the pollen of the gramineae family, and all of these responded in an entirely ana'ogous manner to the inoculation. Of 40 normal persons, who have subjected themselves, at the author's request, to the effects of the pollen, objective symptoms were observed in none. The appearance after inoculation of certain subjective irritations on otherwise normal persons, and the positive reaction on some and the negative reaction noted on others affected with nervous coryza will be taken up later. The effects of the pollen

on persons affected with nervous asthma will also receive mention later. The experiments showed great variations in the sensitiveness of different hay fever patients toward the action of the pollen, that is to say, that the limit at which irritation is endured is variably high in different hay fever patients. The irritation is, however, present in all cases, and the symptoms induced are identical objectively and subjectively. The accompanying symptoms like headache, migraine, etc., correspond entirely to the symptoms observed in many patients in natural hay fever. It is not probable that a gradual heightening of sensitiveness from the normal condition to that of the hay fever patient exists because a large number of patients examined were able to show, without subjective or objective signs of reaction, 20 times the dose which invariably has proved sufficient for the production of active reaction in hay fever patients. Certain conditions seem, however, to exist which form the transitory stage between the normal person and the hay fever patient. The experiments made gave a reasonable basis for the conclusion that a group of persons exist who show a specific susceptibility to irritation by the pollen of grasses, which shows itself by evidences produced on three persons by the application of grass pollen to their mucous membranes and by the production of symptoms corresponding to hay fever. It is as yet impossible to say that there are persons who do not react to pollen of grasses, but to pollen of other plants in a similar manner. Should it be possible to prove that such persons can be found it would still be proper in view of the absolutely individual results of the experiments on a relatively large number of people to regard persons susceptible to specific reaction from grass pollen as hay fever patients.

These experimental results make it impossible to look upon hay fever as a nervous coryza and difficult to differentiate from it.

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*After the above report was submitted it was found possible to prove that the pollen grains of the lily of the valley were capable of exciting specific reaction in hay fever patients. This undoubted highly interesting scientific fact is practically of no great moment in regard to the etology of hay fever inasmuch as the lilies of the valley do not, like the grasses, disseminate pollen through the air.

The evident fact that some persons suffer from a nervous coryza who do not react to the application of the pollen granules of the gramineae order, like regular hay fever patients, gives us a strong index for the separation of the reacting from the non-reacting patients, and to classfy them either as hay fever patients or belonging to another as yet not understood affection. The results of further experiments have led me to the conclusion that the grass pollen granules contain the exciting agent of the disease called by almost all authors hay fever, which is differentiated from all other similar affections essentially by the fact that it appears in the affected persons only at the above mentioned period of the year. These attacks appear in all patients living in the same district on the same day almost simultaneously, like at command, and they disappear in all patients at the same time for the rest of the year. The importance of these facts has been overlooked by the authors who still hold hay fever identical with general nervous coryza.

The positive conclusion of the causative effect of pollen granules of the grasses in the production of hay fever led to the inquiry of the chemical or mechanical action of these bodies. The exterior construction of the plant's pollen at first gave rise to the supposition that they merely cause hay fever. The pollen granules of many plants are densely covered with minute and very fine points. It was supposed that these thorns were the agents toward which hay fever patients were extremely sensitive. Among the many varieties of pollen covered with thorns and prominences so far examined not a single variety was found producing a reaction on hay fever patients. The pollen granules of grasses found active on hay fever patients had without exception a smooth surface, which is also the same with the pollen granules of the lily of the valley. As it was evident that chemical and not mechanical irritation had to be considered, it was necessary to inquire whether odorous substances, etherial oils or similar properties were the active agents.

All products obtained from the pollen granules by the action of alcohol, ether, alcoholic ether upon them had no specific effects upon hay fever patients. They were mostly entirely inert. The etherial oils, however, produced intense

irritation upon he mucous membrane. These reactions are of an entirely different kind from those observed in hay fever and their effects are apparent in others as well as in hay fever patients. These materials come, under normal circumstances, in contact with the mucuous membrane of our eyes and nose in such dilution that they are not felt, because the point of irritation has not been approached. Decisive, however, is the fact that the pollen granules retained their specific action on hay fever patients in full force after the extraction of the odorous substances, etherial oils, and other products with alcohol, ether, etc. The pollen of the gramineae differ from pollen of other plants in so far as they contain starch granules, which, as a rule, seem to entirely fill the body of the pollen. When immersed in water the starch bodies of the pollen remain for days and appear as bacteria like rods. They will hereafter be referred to as "starch rods." When immersed in physiologic salt solution they often remain unaffected. When immersed, however, in secretions of mucous membranes, in lachrymal, in nasal or salivary secretions, or in blood serum, and kept at body heat, these starch rods will soon begin to dissolve and to melt, much like sugar melts in water.

If at the moment of complete solution of the starch rods the undissolved portion be separated from the solution by centrifugal process it will be found that the undissolved portion is inert in its effects on hay fever patients. With the solution hay fever can be produced. This observation suggested the conclusion that the active substance of the gramineae grass pollen resided in the starch rods or could be found in connection with them. The iodine reaction of the starch rods is somewhat atypical, as it is not always blue, but at times violet-red. This suggested the idea of a double product probably containing besides starch an albuminous substance. It seemed extremely difficult to decide upon this in view of the extreme minuteness of the proportion. It was finally possible to arrive at the conc usion that the starch rods were not the exciting agent of the hay fever poison. The solubility of the starch granules contained in the pollen diminished in proportion to their dessication. Whenever the dried pollen was pulverized and suspended in a normal

salt solution the centrifugal separation showed a deposit arranged in layers, of which one was a pure white substance, which a microscopic examination showed to be the pure starch rods. The isolation of this layer and its repeated washing produced starch in its pure form and it was possible to demonstrate the entire inertness of this substance on hay fever patients.

The proportion of oxygen contained in the pollen of the gramineae indicated about 25-30 per cent. of albumen. This albuminous substance was extracted with salt solution from the pulverized pollen and deposited by addition of alcohol, after centrifugal separation of the insoluble constituents therefrom.

This sediment, which reacts to all tests for albumen, contains the entire hay fever poison, and it is possible to extract it by this method so completely from the pollen granules that the residue is entirely inert. These albuminous substances obtained in the manner described show in guaiac solution by addition of hydrogen peroxide a blue color, indicating an enzymic reaction. They have proteolic properties and show other enzymic activity. Various reasons suggested the poison of hay fever to be of enzymic nature. Inasmuch as the enzymes cannot be separated from the albuminous substances, and are probably of similar nature, it seemed very difficult to decide whether the enzymes possessed the active hay fever poisons or not. A lucky accident was responsible for its solution. A testube containing about 5 gr. of pollen of corn had been taken along on a journey and they appeared to become fluid. Having no opportunity to determine if such was due to bacterial decomposition, and being at that time without precise knowledge of the nature of the poison, a small quantity of carbolic acid was added to the contents of the tube, to stop the supposed activity of the decomposing bacteria. Later examination of the contents of this tube proved that the addition of carbolic acid had rendered the pollen of corn inert on hay fever patients, but it yet retained active enzymes of various kinds, a proteolitic and a diastatic ferment and an enzyme. The action of the enzymes was therefore not abolished by the addition of the arbolic acid, only he action of the poison. It can therefo:e

be concluded that the hay fever poison is not inherent in the enzymes. The reverse experiment to kill the action of the enzymes without neutralizing the hay fever toxin has as yet not been successful, Heating to 70° C. destroys the toxin as well as the enzymes. Further experiments on this line are being pressed, and it is worthy of notice that pollen toxin, as hay fever poison may properly be termed, is extremely sensitive to acids and alkalies. It is at present to no purpose to enter upon the chemical nature of the pollen toxin. It is sufficient to say that it is an albuminous substance or found in connection with it, and we are in a position to isolate the active substance by extracting it with a salt solution and depositing it with alcohol. The protein obtained in this manner is extremely poisonous to hay fever patients and 1/40 milligram suffices as a rule to produce a violent reaction upon the mucous membrane of hay fever patients. Of late the plan has been adopted to add 1 milligram of the poisonous protein to 2 cc. of water, of which 1 drop is applied to the mucous membrane of the eye or nose of a hay fever patient. This gives a fairly uniform starting point for comparative investigations, which wil be detailed further on. It may be pointed out that protein has been produced from hyacinths and other plants, which had been held responsible for attacks by many hay fever patients. This protein has shown itself entirely inert on hay fever patients, so far as experimental applications have been made. The fact mentioned above, that of nearly one hundred plant varieties examined, with exception of the pollen of grasses, only the pollen of the lily of the valley contains an albuminous substance poisonous to hay fever patients is of the greater interest, as the lily of the valley belongs to the family of liliaceae. None of the pollen of other varieties of liliaceae examined yielded an active pollen toxin, neither did plants nearer related to the grasses than the lilies contain the active agent. Added interest is given to these observations by the fact that toxin of the pollen of the lily of the valley can be neutralized by the antitoxin obtained from the pollen of the grasses. These results seemed so remarkable that the doubt arose whether or not an inadvertent substitution for pollen of lily of the valley by pollen of the grasses had occurred. In order to arrive at unques-

tionable results, pollen of lilies of the valley were repeatedly collected under conditions excluding the possibility of substitution and assuring their purity and with like results. We are therefore confronted with the fact that the pollen of all the 20 or more varieties of grasses and the pollen of lilies of the valley contain an albuminous substance poisonous to hay fever patients of seemingly identical nature. The relation of the toxins to the antitoxins are of such a specific nature, as we know from bacteriological observations in other fields, that we may not merely count upon a chemical differentiation of the toxin of the pollen of the lily of the valley from the toxin contained in the pollen of the grasses. The attempts so far made to establish a differentiation by precipitation reaction have failed, because the graminal pollen antitoxin so far obtained does not produce a precipitate in the corresponding toxin solution.

After establishing the fact that the gramineae pollen contained the hay fever poison, experiments were at once set on foot to obtain a specific antitoxin, *i. e.*, a pollen antitoxin. It became evident that animals of the same kind differed remarkably in their resistance to the action of the hay fever poison. Some of the squirrels soon died after an injection of the poison with rapid loss of weight. Others did not seem to be appreciably affected by the same dose. Especially sensitive appeared to be a French lapin. Almost all of seven goats stood even large doses of pollen toxin with but slight reaction. One of the goats, however, fainted after each injection and finally died a few minutes after an injection. Antitoxic effects began to appear in the blood of some of the goats after injecting them for 4 months, and it did not appreciably increase in its activity by further injections.

Of 8 horses treated with pollen toxin some reacted but feebly to the toxin, others not at all. These were animals of common stock. One horse of blooded stock reacted so violently to the injection of a much smaller dose of pollen toxin than had been well borne by the goats, that for days it was doubtful if he would survive the injection. Several horses have since been found reacting to pollen toxin. These horses when injected with 1-4 grain of pollen granules or with the toxin derived from this amount of pollen grains began

soon after the subcutaneous injection to gap continually. They are freqently affected with severe fibrillary muscular contractions. After a few hours an urticaria-like eruption has repeatedly been observed covering the entire body of the animal. Soon thereafter a swelling at the point of injection appears attaining a d ameter of 60 cm. in 24 hours receding in the course of a few days. The temperature of the animal runs up from 37.5 to 39° and 40° C. The susceptible horses lose appetite for a few days and appear with hanging heads severely sick. In the blood of susceptible horses antitoxic properties could be discovered after 4 weeks, 4 injections having been administered. If a drop of the above described toxin solution containing 1/40 milligram of the protein which produces severe reactive spmptoms in hay fever patients, be mixed with a drop of the horse serum possessing antitoxic action it will be found that this mixture, when applied to the mucous membranes of hay fever patients is no longer productive of irritative reaction. In the course of a few months this antitoxic action increases to the extent that one drop of the antitoxic serum suffices to neutralize completely 20–25 drops of the toxin solution. Indications point to the fact that this antitoxic effect of horse serum may be still further increased. With this specifically acting horse serum it is possible to neutralize the pollen toxin in ratio as well as to subdue a reactive inflammation previously produced by the application of pollen toxin to mucous membranes of hay fever patients. Experiments, which have been made along this line in a considerable number of hay fever patients, confirmed without exception the observation that the disagreeable subjective symptoms of burning and itching and the excessive secretion of the lacrimal glands and the nose at once subside. It is naturally impossible to cause an immediate subsidence of the edema of the conjunctiva or of the nasal membranes by the application of the antitoxin. It shows, however, a marked effect in this direction and causes in 15–30 minutes the disappearance of the swelling, which otherwise usually lasts 24 to 48 hours. The application of antitoxin stops the irritation due to relatively large doses of pollen toxin promptly, which may, however, return at times after a variable length of time, even after a few days. In

these cases a second or third application of antitoxin is needed to neutralize the pollen toxin completely

The observation that larger doses of antitoxin are necessary to overcone already existing irritations, than are needed for immediate neutralization of the poison, applies to pollen-antitoxin equally with other antitoxins. This points to the therapeutic necessity, that the antitoxin should be used upon the appearance of the very first symptoms before the recurrence of edema, and preferably as a prophylactic measure. If a drop of pollentoxin be applied to the conjunctiva of a hay fever patient and the antitoxin be used as soon as the itching sets in, the installation of one drop of antitoxin suffices as a rule to prevent further symptoms of irritation. If the installation of antitoxin be however delayed until the appearance of neurosis it takes 3–4 or more drops to cause its subsidence. The results just detailed were made upon artificially produced hay fever in laboratory experimentation. The hay fever season having not yet arrived it was impossible to experiment upon hay fever patients suffering from hay fever produced in the natural way. Dr. Prausnitz had attacks of hay fever in Sicily and in the neighborhood of flowering grasses particularly of barley, especially while handling flowering grasses, and it was possible for him to control them by the use of the antitoxin prepared in the above manner. A subcutaneous injection of 1 c.c. of this antitoxin assured his entire freedom from attack during a day until evening in spite of the fact that he purposely handled an unusually large amount of flowering grasses. These attacks cannot be considered natural hay fever, as Dr. Prausnitz only suffered when he purposely exposed himself to flowering grasses, and only during the time of exposure. Natural hay fever occurs during the hay fever period anywhere in the open air. It is to be inferred that therapeutic measures will be of easier application and surer result than in the laboratory experiments or as in Dr. Prausnitz' experience, as much larger quantities of poison have been used in these instances. than can possibly be encountered under normal circumtancess.*

*Since writing the above the conditions have changed in so far as the experience of early hay fever symptoms have been reported

The serum as might have been expected, was used entirely according to directions. A drop of serum was inserted into the eye and the expectation was entertained that asthmatic symptoms could thereby be at once removed. Oftentimes it was expected that a single application of serum would at once and forever cure the most aggravated attack of hay fever. The accompanying instructions seemingly remained frequently unread. On the other hand reports have been received indicating the use of the serum by physicians with extraordinary understanding of the subject. One physician, for instance, applied the serum in a very severe case of hay fever asthma, in 3–4 drop doses in each side of the nose, at first at intervals of 10 minutes, then in one-half and again in one hour. These applications caused all objective symptoms to subside promptly, and the objective symptoms receded too quickly, and resulted in a refreshing sleep after intense suffering in spite of the administration of the usual medication. A similar use of the serum by other physicians was followed by prompt and lasting subsidence of the attacks of coryza and swelling. The report of an officer, who usually suffers severely from hay fever, and whose duties compelled military maneuvers among flowering fields of cereals, shows he remained free of every sense of irritation if he instilled one drop of pollen toxin into each eye and each nostril before rising. He could remain 45 hours in the open air without annoyance. If he again applied serum to the locality where the first symptom of itching reappeared he remained altogether free. Other patients were compelled to use the serum more frequently. Without closely considering the numerous reports received from many places it can be stated as the main result of the observations at hand and in confirmation of my previous communications, that a careful prophylectic use of the serum or its use as soon as the first symptoms of irritation from hay fever poison appear, will bring about a surer result and with a smaller amount of

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to me from many sources. As in the personal experience of the author, the first symptoms were an itching and burning of the conjunctiva. The application of one drop of antitoxin has, as the reports state, sufficed to regularly abate these symptoms. On June 5th many reports of flowering cereals and grasses were at hand.

serum, than when used after the establishment of a severe attack. It is necessary to admonish an economical use of the serum not only on account of the as yet necessarily high price thereof, but also because of the available supply of antitoxin for this year, is quite modest. Our expectations from the external use of the antitoxin were surpassed in some respects as the reports show. While the observations of Dr. Prausnitz on himself seemed to justify the expectation that the external application of the serum would prevent the appearance of a renewed attack for one-half to one hour, it was hardly to be expected that this freedom would extend to five hours. The question opened by this observation cannot be settled in a day, and it will take a careful critical review of all the communications received and to be received for some weeks to determine the exact dependence we may put in the therapeutic use of the antitoxin. The exact use of antitoxin in the therapeutics of hay fever asthma will be of extreme interest. It might be that a timely application to the conjunctival and nasal membranes will prevent the attack. Its use at the exact and proper time will for various reasons not be always possible, and the question arises how far the pollen toxin may be neutralized after its resorption, probably by subcutaneous injection or by resorption from applications to the nose. The case above recited seems to justify the hope. The use of antitoxin externally is preferable to the subcutaneous use, should it prove efficient in the control of asthma, for these reasons: The subcutaneous use of hay fever antitoxin is entirely inert so far as present experience goes, on normal human beings, while its subcutaneous use on hay fever subjects gives rise to quite disagreeable symptoms of irritation. An injection in the forearm produces frequently a swelling starting at the point of injection and spreading over the entire forearm accompanied by a feeling of heat, redness and disagreeable itching. These symptoms may last for six days. Repeated injections seem to a certain extent to produce immunity to these accompanying effects of the injection, which are however not observed in all hay fever patients. Should hay fever asthma be not controlled otherwise than by subcutaneous injection of the antitoxin, the subcutaneous use of the serum may be ad-

vised without great fear from the accompanying effects, which are far less disturbing than a severe attack of asthma. This question might in the end be left to the individual determination of the physician or patient, if he desires to use the serum subcutaneouly against hay fever asthma or not. Its general use subcutaneously cannot, after what has been said, be at present advised. The local application of the serum to mucous membranes is not productive of amazing symptoms beyond a barely perceptible irritation due to the quantity of carbolic acid contained in the serum as preservative. It can be considered as a fortunate condition that the topical application of this particular serum, which in its subcutaneous use affects adversely mostly or altogether those to whom it might be of specific value is the simplest and probably in most cases quite efficient. It might also be reasonably expected that it will yet be possible to free the antitoxic serum of the products which are productive of the disagreeable accompanying symptoms. It was observed that the increasing efficiency of the antitoxin did not increase the intensity of the accompanying symptoms, but rather lessened them. It may be therefore concluded that the antitoxic action is in no relation to these symptoms and not depending on the product which causes their appearance, and that their removal will not detract from the efficiency of the serum. Until effective antitoxin was obtained it was the author's observation that an instillation of toxin into the conjunctiva sack or to the nose was quickly productive of severe palpitation and general malaise to the extent of prohibiting mental exertion. Since the use of the antitoxin in neutralizing the irritating attacks due to the effects of the toxin such systematic symptoms have been prevented. This observation gives rise to hopes, which report seem to justify, that the timely external use of the antitoxin will be able to prevent the appearance of asthma The subcutaneous use of pollen antitoxin produced in hay fever patients symptoms of irritation in the eye, sneezing, swelling of the nasal mucous membrane and other symptoms of hay fever as well as severe asthma-like attacks. The symptoms produced by these subcutaneous injections of pollen toxin were so violent and threatening that a repetition of the experiments is not permissable. The symptoms produced in Dr. Prausnitz's ex-

perience were rather on the body surface. In the author's experience severe and threatening heart symptoms occurred after the subcutaneous application of the toxin. In normal persons no reaction was produced by the subcutaneous injection of pollen tox n. It is at present impossible to determine if there are not some which will show a certain amount of reaction toward the injection of pollen toxin. The above mentioned successful effort of Dr. Prausnitz to immunize himself against hay fever attacks by subcutaneous injection of antitoxin for an entire day, indicates to hay fever patients who are compelled to travel during the time they are affected or who, as doctors, have to perform important operations, or as officers who wish to remain available for duty, that by only prophylactic measures for a short period of time they can keep themselves in condition for work, without being compelled to make frequent use of the antitoxin externally. This short exemption of attacks will for the present have to be bought by frequently very disagreeable effects on the inoculated arm and must therefore be regarded as an exceptional measure, especially as it does not seem unlikely that the effects of the external application of the serum may last for one or more hours. The attainment of prolonged passive immunity of hay fever patients against hay fever attacks, or even better, the attainment of a method of inducing active immunity must be left to the future, though favorable indications in this direction are at hand.

In conclusion, a few words may be said concerning the individual predisposition to hay fever, The application of pollen toxin to conjunctival or nasal mucous membrane has made it possible, as mentioned before, to recognize hay fever patients by its production of violent irritation, which remains entirely absent in normal persons. It is unnecessary to point to the far-reaching importance of this observation. There are, as you know, still eminent physicians and epidemiologists who deny the existence of an individual predisposition both as to infectious diseases, as cholera, typhoid fever, diphtheria, etc., as well as to other similar and hurtful influences. In order to prove the fallacy of denying the existence of individual predispositions, experiments with hay fever antitoxin are hardly necessary, as observations in

sufficient number are at hand to prove the existence of an individual predisposition in cholera, diphtheria and other infectious diseases. It has, however, been heretofore impossible to approach this question experimentally. The discovery of hay fever antitoxin has made experiments on this line possible. The opinion has of late been largely held that hay fever was not a disease sui generis, but belonging to the class of nervous coryzas, from which it could not be distinguished, and that its attacks were prevalent in winter as well as in summer. These opinions are certainly erroneous. Several cases of nervous coryza have come under observation which showed so little reaction to the application of hay fever toxin as normal people. On the other hand, several persons were observed reacting to the application of pollen toxin who denied having hay fever but admitted having an affection which at any time of the year was productive of hay fever like attacks. One case of nervous asthma reacted to pollen toxin, but the patient stated that he did not suffer from hay fever in the summer. Finally, quite a positive reaction was observed in a patient with chronic conjunctivitis, who stated that he did not suffer with hay fever. The following experience will show the necessity for great care in these investigations. The instillation of pollen toxin into the eye of persons not affected with hay fever caused them to complain of a burning feeling in the corresponding eye. Objective changes such as are always present in hay fever patients, were entirely absent. Subsequent applications of physiological salt solution into the same eye of the same persons caused the same burning sensation. The application of salt solution or pollen toxin to the other eye were borne without any inconvenience whatever. In all cases it was the right eye which showed increased sensitiveness, and it happened to be persons who used their right eye constantly in microscopic work. This, therefore, was not an irritation due to a specific action of the pollen toxin, but a general hyperethesia due to excessive use and of considerable clinical interest. It is inopportune to consider as yet the effect of pollen toxin on the interesting conditions occupying the state of transition between the normal person and the one affected with hay fever neither can we enter into the question, if the autumnal

catarrh of the United States does not depend upon entirely different causes, probably upon the pollen of other plants. The decision of these questions take much time. It is hardly necessary to enter into the consideration of localized obstructions of the upper air passages, especially of the nose, or of local excitation of the regions of mucous membrane supplied by the trigeminus as a cause for disposition in hay fever, when we consider that the excitant is a soluble poison, which is productive of irritation when applied to the rectal mucous membrane and even to the epidermis of hay fever patients. The cause of hay fever being a soluble poison suggest the thought that normal persons have the capacity to oxidize or in some way to destroy this toxin before its effects can become active, or it is possible that the normal person possesses active bodies capable of immediately neutralizing the poison. The following experiment does not give support to this view, which suggests itself readily enough. A solution of 1 mgr. of pollen toxin in 2 cc of blood serum of a normal person does not show, when applied to a hay fever subject, a partial or complete destruction of the toxin, but its action shows a greatly increased activity as compared with a watery solution. It follows, therefore, that normal human blood serum contains no bodies possessing the property of neutralizing the toxin. The possibility seemed to exist that the blood of hay fever patients contains substances which convert the pollen toxin into a poison, and make it active, analogous to the observation of snake poison by Ehrlich and his followers, but experiments to solve this question gave a negative anewer to this supposition. Pollen toxin dissolved in the blood serum of hay fever patients does not become thereby active on normal persons. A former publication enters more fully into all questions of individual predisposition.* The fact of exemption from hay fever of savages and practically of the laboring classes in civilized countries, as well as other considerations, suggest that we must look upon hay fever as one of the consequences of higher civilization. The further fact that mental over exertion, grave infectious

*Cause and Specific Cure of Hay Fever. R. Oldenburg. Munich and Berlin.

diseases, especially la grippe, are productive of a hay fever diathesis leads us to the supposition that we must regard this diathesis as a permanent specific injury to the central nervous system. The hay fever diathesis seemingly does not depend upon gout or other constitutional anomalies. This hay fever diathesis seems closely allied to the idiosynocrasies shown by many people against strawberries, crayfish, honey and other substances. We are dealing with a congenital or acquired hypersensitiveness toward specific substances which cannot be explained as Behring does in diphtheria, by a defective elimination of free receptors. The report does not present a complete work. It has opened a view into a field of work which reaches beyond the special field of hay fever, far into the field of physiology, general pathology and epidermiology. To encourage work in this apparently fruitful field it is the hope of this communication.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY. NINTH ANNUAL MEETING, HELD IN LEXINGTON, KY., APRIL 30, MAY 1 AND 2, 1903.

J. A. STUCKY, M. D., OF LEXINGTON, KY., PRESIDENT.

President's Address.

Dr. J. A. Stucky delivered this address. He said that the society had good reason to be proud of its rapid growth and great achievements in the few brief years of its existence. It had been organized on a broad foundation, and there should be no fence put up to prevent the entrance of those who were loyal to the code and had won their spurs. The existence of this society had shown the wisdom of following the broad principles laid down at its very inception, and at the present day its members recognized no east or west, no north or south, but one brotherhood and one purpose.

Folding Head Band.

Dr. S. MacCuen Smith, of Phlladelphia, exhibited a folding head band, which was convenient, because of its great portability. It was not his own device.

New Instruments.

Dr. Chevalier Jackson, of Pittsburgh, exhibited a skiagraph of the skull; also his emergency thyrotomy canula, an instrument modeled after the ordinary medicine dropper, and used for checking hemorrhage. His turbinotomes were presented, and the statement was made that the operation was done very quickly and did not provoke either immediate or secondary hemorrhage. He made use of cocain and adrenalin before the operation, and a gauze packing for twenty-four hours after the operation. In about 5 per cent. of the cases it was necessary to pack again for twenty-four hours.

An adenoid curette with an attachment for preventing the

dropping down of a portion of the adenoid into the larynx was shown; also some chisels for mastoid operations, and an improved trephine.

A transillumination lamp was presented. It was intended to be operated by a 110 p. volt current without any reduction of the current. If left in the mouth more than a minute it would become uncomfortably hot, but this time was sufficient for the examination. He was disposed to think that much of the present skepticism regarding transillumination arose from the fact that miniature and very inefficient lamps had been commonly used. The intensity of the light could be easily modified as desired by the use of a rheostat.

Dr. J. M. Ray, of Louisville, said that mistakes were frequently made in examining the mouth, because of the difference in the intensity of the light used. With a very brilliant light, like the one just presented, it was probable that it would pass through an antrum, even though the latter were blocked with pus.

Dr. C. R. Holmes, of Cincinnati, thought the point had been well taken about the wrong conclusions likely to be drawn from the use of a light of too great intensity. While it was desirable to have an intense light, this should be capable of regulation at will.

Dr. C. G. Coakley, of New York, said that he had never tried transillumination in daylight with such intense illumination; nevertheless he firmly believed that the same amount of illumination could not be used in different persons. If the examination were made in a darkened room a lamp of two or three candle power would give sufficient illumination, although even with such a lamp it was important to have means for regulating the intensity of the light. With regard to the scissors, he would say that he had not found any scissors which would do the work as well as a snare. The scissors occupied much valuable space. For post-nasal work he would not like to use the ratchet instrument, as the sliding attachment would allow of more rapid operating. Some of these so-called hypertrophies were really edematous masses and could not be secured by a snare without an anesthetic. The operation with the snare must be done almost instantaneously, because of the attendant pain.

Dr. Wendell C. Phillips, of New York, said he had recently had some experience in this field. He liked the forceps exhibited for removing hypertrophied tissue, but the problem was somewhat different in connection with the inferior turbinate, for, in some instances at least, scissors would not take off the bone. He thought Dr. Jackson had underestimated the importance of secondary hemorrhage, especially when removing the posterior portion of the inferior turbinate bone. Personally he had had far less trouble in this respect since he had adopted the plan of giving the patient a mild solution of adrenalin, with instructions to spray the parts frequently with this solution, until after the time for secondary hemorrhage had gone by.

Dr. L. A. Coffin, of New York, could not understand how the scissors could be opened widely enough to allow of the removal of the turbinate *with one clip*, and at the same time get into the nostril. Like Dr. Coakley he preferred the use of the snare. Neither primary nor secondary hemorrhage after operation on the inferior turbinate should be looked upon lightly. For the last few months he had adopted the plan of applying the snare and then putting the patient in another room on his back. From time to time the instrument was given a slight turn, and in time the hypertrophy was removed without bleeding and without pain, except on the introduction of the instrument. After the removal of the snare he paid no attention to the portion removed, as it would take care of itself.

Dr. Jackson said that a large experience with his instruments made him feel sure that they were at least worthy of trial. He would positively dissent from the statement that it was possible with his brilliant lamp to fail to obtain a shadow indicating pus in the antrum. The turbinotomes were entered into the nostril while closed, and were then expanded.

Dr. F. C. Cobb, of Boston, said he did not think it was the pus that produced the shadow in an antral empyema, for he had found the shadow quite as dark after washing out the antrum as before. The shadow was produced by the thickening of the mucous membrane, resulting from edema and the polypoid degeneration of the membrane.

Foreign Body in Nose for Thirty Years.

Dr. W. L. Ballenger, of Chicago, presented a specimen removed from the nose. At the time it was supposed to be a rhinolith. The case was one of foul-smelling suppuration of the nose. According to the history, thirty years ago the patient's eye was destroyed by the explosion of a gun. On cutting open the mass removed from the nose it was found that the core of the foreign body was the breech-pin of a musket.

A Case of Lipoma of the Tonsil.

Dr. Clement F. Theisen, of Albany, reported this case. The patient was a girl or eight years, seen in December, 1902. She had suffered several years from a severe paroxysmal cough. Examination showed a smooth-surfaced yellow tumor about the size of a marble, which was attached to the centre of the right tonsil by a long, thin pedicle. Dr. George W. Blumer reported that the tumor was a lipoma. The speaker said that he had been able to find only six other cases of true lipoma of the tonsil on record. They were the rarest of the benign tumors of this part. It was rather remarkable that the majority of the cases had been found in adults, one being in a person ninety years old. As a clinical feature, the yellow color of the fatty tumor was important, though not pathognomic. Practically, the only way that a positive diagnosis could be made was by histologic examination. Removal of the growth by the hot or cold snare, or by the scissors, was the only treatment.

Retropharyngeal Abscess. Report of Three Cases.

Dr. L. C. Cline, of Indianapolis, presented this paper. He said that, from the fact that these abscesses were associated with or followed naso-faucial inflammation, it was reasonable to suppose that these abscesses were dependent upon infection in that way. The first case reported was that of a child of five and a half years, seen in consultation. She was greatly emaciated, had a temperature of 101°F. and suffered from attacks of dyspnea. The neck was greatly distended, especially on the right side, and there was a peculiar croaking cough. An incision was made and pus evacuated. She did

well for five days, when she suddenly had a choking attack, and was so near death that the attending physician did an emergency tracheotomy. Subsequently better drainage was established and the child made a good recovery. The second case was that of a man with a troublesome spasmodic cough. There was a large swelling involving the whole of the posterior pharyngeal wall. A long and deep incision was made in the median line from below upward, but there was only a scanty discharge of pus and connective tissue. The patient was relieved, but continued in poor condition because of the general sepsis, and died in a choking fit two weeks later. The case was apparently of tuberculous origin. The third case was that of a child of two years and a half, seen in March, 1903. After recovering from measles the child developed a croupy condition and, for a few days before being seen by him, had had a peculiarly severe paroxysmal cough. There was a large swelling on the posterior wall of the pharynx, and this was freely incised and a large quantity of pus evacuated, Recovery was rapid.

Dr. C. G. Coakley commented upon the fact that these cases occurred for the most part in private practice. In the public clinic he frequently saw six or seven of these cases in the course of a winter. These abscesses seemed to originate in some infected lymphatic gland in this region, often as a result of tuberculosis. A bacteriologic examination was not of much importance, because of the many micro-organisms found in the throat. He had seen but one case of retropharyngeal abscess in private practice, and that was in a man about thirty years of age. There was no enlargement of the tonsil or edema of the pillars of the fauces. Incision gave speedy relief. Sometimes these abscesses were secondary to caries of the cervical vertebrae. It was his rule to employ the incision through the mouth, beginning far down in the median line and carrying the incision as far as the swelling extended. The patient's head was then lowered and the finger used to press out the pus. Sometimes this opening closed, requiring a second or, perhaps, a third incision. Although he had operated several times upon patients almost moribund, he had had no serious complication arising from the passage of the fluid down into the air passages.

Dr. F. C. Cobb said that he had seen a good many of these abscesses at the Massachusetts General Hospital. It was always well to examine the cervical vertebrae. In young children it was his practice to make a broad incision and take pains to keep this incision open. Apparently the opening had partially closed in one of the cases reported in the paper. There seemed to be very little risk of suffocating the patient by the escape of pus.

Dr. S. MacCuen Smith, of Philadelphia, said he would like to know what provision Dr. Coakley made to prevent injury to the vessels of the neck.

Dr. Coakley said that he found the old-fashioned hatchet-shaped gum lancet a useful instrument for opening these abscesses. The abscess usually stood out quite prominently, and the blood vessels were displaced laterally, so that there must be comparatively little danger of injuring them by the incision of the abscess.

Dr. George L. Richards, of Fall River, thought these cases were more common than appeared from the records, and that children often died from this condition without its being diagnosticated. He recalled a case in which a child had been brought to his office almost asphyxiated. On passing in his finger he felt the abscess, and instantly he opened it with his finger nail, giving the child relief. Although an emergency method, it was justifiable sometimes in general practice as a life-saving measure. He did not think there was much danger of hemorrhage in operating upon these cases. In incising the abscess he made the incision both upward and downward, sometimes for fully two inches, to make sure that the whole extent of the abscess was laid open. With concentrated peroxid of hydrogen solution, on a cotton pledget, he then swabbed out the abscess cavity.

Dr. W. H. Dudley, of Easton, Pa., said that the second case mentioned in the paper recalled one that had once come to him, with a history of paralysis of one of the ocular muscles. The patient had been on antisyphilitic treatment, without benefit, and was in wretched condition at the time. Examination revealed a fluctuating tumor of the pharynx, and on incision of this complete and permanent relief was given.

Dr. J. H. Ray, of Louisville, had not found these abscesses particularly rare, especially in nursing infants. Sometimes these abscesses were traumatic, and they were usually situated very low down. In one such case the breast bone of a quail had lodged in the esophagus, and in the efforts to remove the bone the family physician produced considerable traumatism. Some days later the neck swelled, deglutition became almost impossible, and the patient had that peculiar croaking voice so characteristic of retropharyngeal abscess. The mirror showed a swelling down near the larynx. This was incised and considerable pus evacuated. In another traumatic case a pin had lodged in the larynx of a boy two days before. The pin was deeply buried in the tissues, and was removed with difficulty. A week later the child returned with a circumscribed swelling low down on the posterior wall of the pharynx, associated with much infiltration of the larynx,

Dr. Chevalier Jackson said that in opening these abscesses he made use of a bistoury or scalpel, the greater part of the blade of which was guarded by wrapping it with adhesive plaster.

Dr. Cline, in closing his discussion, said that the first case had lasted six weeks and general infection had already occurred, which probably explained the refilling of the abscess.

A Case of Tubercular Laryngeal Stenosis Treated by Tracheotomy.

Dr. Price Brown, of Toronto, reported this case. The patient was a man of thirty-one, who had been referred to him on April 2, 1901. He was suffering from night-sweats and a frequent racking cough. Tubercle bacilli were not found in the sputum at the time. The left side of the epiglottis was decidedly infiltrated, and the whole larynx was bathed in mucopus. An alkaline spray was used daily, followed by menthol and lanolin, and at intervals of a few days an application of a 50 per cent. solution of lactic acid was made. By May 12 the patient had improved considerably, both in the local and general condition. On May 13 there was a chill and a rise of temperature to 103° F. The lungs showed fairly

advanced tuberculosis. The patient then began living outdoors in a tent. Eleven months later his condition had improved so much that he was admitted to a sanitarium for incipient tuberculosis, although he had been refused admission at the time of commencing the tent life. Nevertheless tubercle bacilli were found in the sputum. On November 10, 1902, the larynx became so edematous that he felt justified in doing tracheotomy, and high tracheotomy was performed. From the time of the operation the laryngeal symptoms slowly improved. For many weeks now the temperature had remained normal and the patient had regained his full normal weight. No tubercle bacilli were found at present in the sputum. The tube was still worn, and when the opening was closed with the finger the patient could speak in guttural tones. There were no visible ulcerations in the larynx. After another summer of tent life it wa purposed to attempt the cure of the laryngeal stenosis by the use of graduated tubes.

Dr. John A. Thompson, of Cincinnati, thought tracheotomy was indicated in those comparatively rare cases of tubercular laryngitis, in which there was extensive infiltration with comparatively little trouble in the lungs. He had seen such a case first about eleven years ago. In that instance the dyspnea was extreme, and was due to the fixation of the cords by extensive infiltration. Under local treatment this infiltration was absorbed, and instead of dying within a month, as had been expected, she was still alive and hearty. The other side of the picture was the danger of infection of the other tissues of the neck by tuberculosis. This was exemplified by another case, in which low tracheotomy was done and a laryngofissure established. The latter healed readily, but the tracheotomy wound became infected by the sputum, and the tissues of the neck broke down very rapidly. The unknown element of vital resistance must always be an uncertain factor in determining whether or not tracheotomy was desirable.

Dr. C. F. Thiesen spoke of a case of laryngeal tuberculosis which had been complicated by a severe attack of grippe. This was followed by such severe dyspnea that immediate tracheotomy was demanded. The trachea was not found in

the usual position, but considerably to the left of the median line. On opening it several ounces of pus escaped from an abscess connected with the trachea low down. The man eventually died some weeks later of a septic pneumonia.

Dr. Price Brown closed the discussion. He said that the last speaker's remarks reminded him of a case of abscess of the larynx that he had seen at one time, and in which death occurred during the night. It was undoubtedly important to carefully select the cases.

The Pathology of Ethmoiditis Reconsidered.

Dr. Edward Woakes, of London, England, sent a communication on this subject, which was ordered read. The author stated that there was certainly a specific character to this disease. In the first stage morbid changes were found only in the mucous membrane. Sometimes some myxedematous tissue would be in evidence. The glands embedded in the newly formed fibrous tissue were not only compressed, but were often absorbed and assimilated. In the second stage the small arteries of the submucous stratum were invaded and coincidentally myxoma developed from within, and the bone itself became thinner by absorption. Later on sharp spicules of earthy matter projected from the surface, and by this time or perhaps long before the fibrosis itself tended to atrophy. The author then raised the question as to whether fibrosis was due to the pre-existence of a constitutional diathesis, and expressed the opinion that the answer would probably be found by future research in the field of the rhinologist.

The Import of the Salivary and Nasal Secretion in Hay Fever.

Dr. D. Braden Kyle, of Philadelphia, was the author of this paper. He said that he had first become interested in this subject eight years ago. There could be no doubt that with the variations of reaction from alkaline to acid, and *vice versa*, the secretion must undergo decided changes in its chemical composition. It was a well known physiological and therapeutic fact that certain drugs exerted a selective action upon certain parts of the body. He had become convinced

that by studying the saliva one could determine important changes in the chemical processes going on in the body. Hyperacidity was said to favor chemical change in the tissue with an increase in the proportion of organic acid. The chemical action of the saliva depended upon its ferments, the most important of which was ptyalin. A great many morbid processes had been traced to uric acid, but he believed that many equally important substances were deposited and eliminated. In this way might be explained many of the reflex neuroses, as for instance, hay fever. After a series of examination of the saliva of certain individuals afflicted with hay fever, and of those not so afflicted, he had become convinced that the irritation often arose from a chemical change in the saliva. There was apparently a field for investigation in this direction. He had known a teaspoonful of common salt, swallowed at one dose, to cut short more than one attack of hay fever, thus showing the relation between the chemistry of the secretions and such irritative conditions. Hay fever rarely, if ever, manifested itself in atrophic rhinitis, a condition which involved the mucous secretions. Certain attacks of so-called hay-fever often came on suddenly, without apparent exposure to cold or other common source of irritation. In such cases he believed that, owing to some alteration in the chemical composition of the saliva, substances were formed, which, on exposure to the air, became decomposed and gave rise to irritants. Such an attack was comparable to the condition resulting in some individuals from the inhalation of ammonia. Normally, the sulphocyanides and ammonia salts in the saliva were present in about equal proportions, whereas in many of these cases these compounds had been found to be in excess. In cases of hyperacidity the sulphocyanides were in greater proportion than the ammonia salts, and the secretion was less irritating; in cases of diminished acidity the reverse was true.

Dr. Norval H. Pierce, of Chicago, said that there seemed to be a law governing infections, which was operative in all cases. A change took place in the body prior to infection with the microrganism. In Pasteur's well known experiments with chickens certain microorganisms of a certain virulence were introduced into the throats of chickens, and the latter

were kept at a certain temperature. Almost without exception, when the temperature sunk below a certain point and remained so for some time, active inflammatory changes supervened. Pasteur explained these phenomena by saying that the cold produced in the cells of the chickens a change, which permitted the microorganisms to become active. We were all frequently exposed to infection by various microorganisms and yet it was only exceptionally that we did actually become infected. Too little attention had been paid heretofore to the chemical changes occurring in the secretions. In the common rhinitis, in which the body was subjected to a chill, the chemistry of the secretions was altered, and, as a result, certain substances were formed, which were irritants to the mucous membrane. He believed the time would come when one would be enabled to demonstrate that heat and light themselves might produce such changes as were represented by the condition known as hyperesthetic rhinorrhea. He had a patient under observation who would escape from an attack of hay fever at a certain time of the year so long as he wore dark glasses, but on removing them the attack would occur, and would continue for some time, even though the glasses were replaced. When an ear drum was perforated the original infections played a secondary part as compared with the germs of putrefaction which were introduced through the external auditory canal. The secretions which were the result of the inflammation were decomposed by these putrefactive organisms, which cast off a chemical irritant. The latter in turn reacted on the mucous membrane, and a vicious circle was established. He recalled a case of a gentleman, who had accidentally discovered that if he took two drachms of phosphate of soda after an excess in eating or drinking this would entirely prevent an annoying pharyngitis which would otherwise supervene. In another case the taking of bicarbonate of soda into the stomach would bring a rhinitis to a close.

Dr. H. Holbrook Curtis, of New York, said that the theory presented in the paper only seemed to explain a certain class of cases. He had collected about 8,000 replies to his circular regarding hay fever and, while he had not tabulated and classified these, he was disposed to believe that hay fever

could be divided into three classes, viz: (1) A systemic condition, which might give rise to the winter variety of hay fever, e. g., explosions of uric acid in the blood or the chemical changes described in Dr. Kyle's paper; (2) a local condition in which the application of certain pollens or effluvia precipitated an attack of hay fever, and (3) a neurotic condition. It had been proved that a person who had hay fever, so called, did not have it if a horse had been thoroughly smeared with vaseline. It had been also proved that the irritant was an emanation from the body of the horse, either dandruff or perspiration. The elephant house of the menagerie was the cause of an acute hay fever in some individuals, while some experienced an attack from the inhalation of any dust. In one case of this kind he had effected a complete cure by removing a posterior hypertrophy of the turbinate.

Dr. C. F. Theisen referred to the very recent investigations of Dr. Dunbar of Hamburg. Dr. Kyle's theory, no doubt, accounted for many cases of hay fever, but he did not see how it would explain the experiments of Dr. Dunbar. This investigator's laboratory experiments in this field had extended over a number of years, and he had found that from various grains, particularly maize, were obtained a pollen poison which, when introduced into the nostrils of hay fever patients, would result in a typical attack of hay fever, even in winter. Again, by inoculating animals he had obtained an antitoxin which would absolutely neutralize his pollen tox n. Further than this, the pollen toxin was introduced into the noses of a number of persons who had never had hay fever, and the result was negative. We should distinguish between typical hay fever and that designated by the Germans as rhinitis nervosa.

Dr. Coakley said he had been deeply interested in the paper. Many of the statements made therein tended to confirm the results obtained by Dunbar. This gentleman found that in the interior of the small granules of pollen was a starchy body wh ch was soluble in salt solution and blood serum, and when this was injected it gave rise to hay fever. However, on reading Dr. Dunbar's paper, he had been disappointed with the therapeutic results thus far obtained. In atrophic rhinitis the condition was such that there was very

little secretion and, hence, very little opportunity for the pollen to be dissolved; consequently, there was not much opportunity for absorption.

Dr. Price Brown said that he knew a gentleman who had suffered for years from hay fever, and had not been benefited much by any treatment. The speaker had advised him, last summer, to go to the country and work vigorously during the whole of the hay fever season. He lost his appetite, but suffered from thirst. The thirst he quenched by drinking lemons. He wholly escaped hay fever that time, and this, Dr. Brown thought, would be explained on the theory of chemical changes in the secretions.

Dr. S. MacCuen Smith said that it had been a tradition in his locality that hay fever could be relieved by taking a teaspoonful of table salt in one or two pints of hot water on retiring. This would not cure all cases of hay fever, but it would certainly abort many of them.

Dr. J. A. Stucky said that he had previously pointed out, in a paper on lithemic nasopharyngitis, that these neuroses were often due to intestinal intoxication, and that, as a result of a series of urinary examinations, he had found that there was an excess of indican in these cases. Continuing this investigation, he had since found an excess of indican present in 11 out of 17 cases. Another matter of interest was that it was exceedingly rare, indeed, to find hay fever in the laboring classes. In an experience of twenty-two years he had only seen it once, and that in a negro cook, who was cured of his hay fever by sending him out to work on a farm.

Dr. Kyle, in closing the discussion, said that he had not stated that all cases of hay fever were dependent upon change in the secretions. The case of hay fever brought on by leaving off the glasses, was evidently one in which there was some refractive error or the glasses would not have been worn; and, again, if lacrimation resulted from leaving off the glasses it was easy to understand how nasal irritation might result. He knew of a whole family who were exceedingly ensitive to the fumes of ammonia, and who could not on that account go near a horse without getting an attack of fever. These persons suffered from the inhalation of aromatic spirits of ammonia.

A Case of Bilateral Abscess of the Septum with Well-Marked Symptoms of Septicemia.

Dr. W. L. Culbert, of New York, reported this case: The patient was a man of thirty-one, a cigarette smoker, and a moderate drinker. Five days previous to coming under observation he had contracted a severe "cold." His temperature was 104° F., and his pulse 132, and the skin was clammy. There was intense throbbing pain; the nose was completely occluded; the mucous membrane was loose and there was a boggy and fluctuating tumor. Both abscesses were opened by a vertical and horizontal incision, and the relief was immediate. The cavities were irrigated first with peroxid of hydrogen and then with weak carbolic acid solution, and were then lightly packed. By the next day all of the septic symptoms had disappeared. Five days later the septum appeared normal. The patient brought with him a quadrangular piece of necrosed bone that had been discharged from the nose. The occurrence of septicemia in such a case was not usual, and the etiology of these abscesses was somewhat obscure. The fact that the abscess was bilateral and involved both the cartilaginous and bony septum was also of interest.

A Case of Epiglottic Abscess with Secondary Involvement of the Cervical Glands.

Dr. Culbert also reported this case. The patient was a merchant, 34 years of age, who had consulted him last summer because of painful and difficult deglutition and a sense of swelling in the throat. He was undoubtedly gouty, and had suffered previously from several attacks of quinsy. The anterior chain of lymphatic glands of the neek was swollen and tender. His temperature was 100°F., and pulse 90. The mirror showed a mass at the base of the anterior surface of the epiglottis a little to the left of the median line. There was no tumor or involvement of the larynx. The abscess was opened by the use of a sharp, curved aneurism needle. Relief was immediate, and the enlargement of the lymphatic glands disappeared in a few days. The extensive involvement of those glands was a point of some interest,

Dr. George L. Richards said that last winter he had first

seen a case of abscess of the septum associated with septicemia. The patient was a physician whose nose had been injured by the break-down of his carriage. An abscess of the septum developed in three or four days, and it was incised by another physician. The man then developed a temperature of 103° F. and simultaneously a pain in one knee. The condition grew worse in spite of washing out the wound. Finally, Dr. Maurice H. Richardson operated, opening up several small abscesses. It was several months before the patient was able to resume his work. Some of these cases of septal abscess led to considerable deformity of the bridge of the nose.

Dr. C. Coakley said that the tendency of the cartilage to break down was very great, and took place quite rapidly. He thought it possible that the piece of bone discharged in Dr. Culbert's case was a part of the anterior portion of the ethmoid. He had advocated the use of the Simpson tampon to hold the parts in proper position and to prevent deformity.

Dr. W. L. Ballenger, of Chicago, said that the significant fact about the case of septal abscess under discussion was the amount of septicemia, which seemed to indicate that there had been an extension of the infection beyond the septal part of the cartilage to a part more richly supplied with lymphatics. In his own published case there was bilateral abscess, but there were no marked symptoms of sepsis.

Dr. Culbert closed the discussion. He said that he had been unable to see the patient recently to determine whether or not there was much deformity. He had incised both sides of the septum largely with the idea of avoiding deformity.

The Relations of the Upper Air Passages to Diseases of the Gastro-Intestinal Tract.

Dr. L. A. Coffin, of New York, read this paper. He said that he had been struck by the large number of his clinic patients who complained only of post-nasal catarrh. The disease *per se* was a local one. The stoppage of the nose at night on the side next the pillow was a common complaint, and was due to hypertrophy of the posterior ends of the inferior turbinate. The pathology was that of a cirrhotic

membrane. The commonest basic principle in the etiology was irritation, and this resulted in hyperemia. The circumscribed area affected was against the view that the condition was the result of general toxemia. As the anterior nares frequently escaped the disease altogether, it was evident that one must look elsewhere than to the inspired air. Children, who seldom had great structural deformity of the nose, were quite as frequently affected with post-nasal catarrh as were adults. The author believed the chief cause of the pathological condition under discussion was the irritation resulting from the eructations of gases from the stomach. He believed that, in considering chronic follicular pharyngitis and nasopharyngitis as frequently secondary to chronic indigestion, one took a logical position, and that better results would follow from treatment founded upon this assumption. Hyperacidity was a most common cause, and the reason it was overlooked was that the great majority of these persons gave no symptoms pointing to gastric disorder. A series of cases had been examined by modern methods for stomach disorder, and the results noted and compared with the examinations made of the upper air passages.

Dr. Joseph A. White, of Richmond, said that, while he had been deeply interested in the paper, he did not feel fully convinced by the author's statements and reasoning. When a medical student, he had been taught that all troubles of the nose, pharynx, larynx and tonsils were invariably dependent upon disorders of the digestive apparatus and especially of the liver. The digestive apparatus was subsequently relieved of some of this onus by the theory that rheumatism was the basis of many of these affections of the upper air passages, and then, in turn, disorders in women, and smoking and drinking in men were also held to be etiological factors. Mere refrigeration was, as a rule, nothing more than a defective circulation of the skin, although perhaps dependent upon digestive disorder. The same was true of many of these other affections, because they were dependent upon circulatory disturbances of the same general nature. The old teaching was to give a calomel or saline purge, followed by the local or internal use of chlorate of potash, and many physicians maintain that this is good therapeutics to-day.

Dr. W. L. Ballenger said that, so far, there did not seem to be any exact evidence as to the relationship between the upper air passages and the disorders of the digestive tract, most of the literature on this topic presenting assertions rather than arguments. The nasopharynx was a region richly supplied with lymphoid tissue, and the region was, embryologically speaking, quite complex. Such tissue was of comparatively low vitality and, hence, more liable to inflammatory disturbances. This was probably one biologic factor in the consideration of nasopharyngeal catarrh. The lymphoid tissue of children was specially prone to inflammation on slight irritation, and, hence, it did not follow that the frequency of post-nasal catarrh in children was due to eructation of gases of the stomach and the regurgitation of irritating fluids.

Dr. F. C. Cobb asked if these cases had been followed, and whether the catarrh had improved as the condition of the stomach had improved.

Dr. S. MacCuen Smith said that the paper was very important and emphasized the statement made in the President's address concerning the necessity of a physician having a good knowledge of general medicine before taking up a specialty. So-called "bilious spells" were often associated with coryza and hoarseness and more or less pain, and the patient at the same time became weak from intestinal intoxication, dependent upon absence of the bile. These cases would improve wonderfully if one gave one-tenth of a grain of calomel every half hour for about ten doses, and followed this the next morning by a saline. After this he was accustomed to give half a grain to one grain of mercury and chalk every night for some weeks; it could be kept up even for months without any cumulative effect from the mercury. Many cases of dry throat would improve wonderfully from giving hydrochloric acid twenty minutes after a meal instead of immediately after the meal. In persons suffering from frequently repeated attacks of coryza the underlying condition was often an intestinal intoxication. His injections into the colon of lukewarm normal salt solusion often proved beneficial.

Dr. J. A. Thompson said that he had seen cases of marked laryngitis which had proved absolutely rebellious to treat-

ment until hyperacidity of the stomach had been diagnosed and properly treated. Clinical experience was the court of last resort in medicine, and we should, therefore, give such experience its full weight. The regurgitation of irritating secretion during sleep was often responsible for pharyngitis and rhinitis. A little over one year ago a patient had come to him with a superficial ulceration on the tonsil which did not resemble either syphilis or tuberculosis. The case was on his hands for months; at one time healing and at another breaking down. The conclusion was finally reached that the recurrence of the ulceration was due to the stomach, and a chemical examination showed complete absence of hydrochloric acid in the gastric juice. When this acid was prescribed internally, the ulceration was speedily and permanently healed. He believed that if in obstinate cases of local inflammation the stomach were more carefully interrogated the key to the trouble would be discovered.

Dr. Lewis C. Cline felt that if this line of investigation were pursued more generally, there would be much less of the saw and cautery. The time had come when careful study of the secretions and better general treatment were demanded.

Dr. Price Brown thought that a great deal of this nasopharyngeal trouble was respiratory in origin. If one made sure that the nasopharynx was free from hypertrophied tissue, little else would be demanded, except some attention to the general health. The reader of the paper had spoken of otitis media as frequently resulting from the vomiting of children. While this might be so in many cases, in many others it was due to the presence of adenoid tissue.

Dr. L. A. McClelland, of Brooklyn, said that he had often noticed that cases of acute and chronic pharyngitis would improve very rapidly under large doses of calomel and jalap followed by salines, and that under this treatment very little local treatment of the nasopharynx was called for.

Dr. Dunbar Roy, of Atlanta, said that it was in the nasopharynx, particularly, that he understood the author of the paper maintained that digestive disorders exerted their influence. Undoubtedly nasopharyngeal catarrh was often the result of stomach disorder, but he had met with cases of nasopharyngeal bursitis again and again as a distinct entity.

The nasopharyngeal catarrh having this foundation, could be relieved in most instances, but nothing more could be accomplished. Persons, who were chronic drinkers, were well known to suffer from chronic nasopharyngitis as well as a catarrhal condition of the stomach. In such cases no other treatment was required, but a withdrawal of the stimulant.

Dr. C. G. Coakley said that if Dr. Coffin had done nothing more than call attention to the fact that some other part of the body required treatment besides the upper air passages, he would have given the members of the society a good deal to think about. It had occurred to him that many of the affections of the nasopharynx associated with digestive disorder were not necessarily produced by the gaseous eructation or by the regurgitation of irritating fluids. In his opinion, altered secretions were more directly responsible for the conditions under discussion.

Dr. Wendell C. Phillips, of New York, said he quite agreed with the last remark of Dr. Coakley regarding the effect of eructations, either in infancy or in later life. It was now well known that suppuration of the middle ear was always due to the introduction of septic material into the Eustachian tube; hence the case reported in the paper did not prove that eructations were responsible for the otitis. He would recommend that calomel and a saline should be administered coincidentally, that is, give half a drachm of bicarbonate of soda every half hour or hour for several hours, and at the same time give the calomel in doses larger than one-tenth of a grain. At the present time he gave half a grain of calomel every hour, until two or three grains had been administered, and at the same time gave large doses of the bicarbonate of soda.

Dr. J. A. White said that while he thoroughly appreciated the paper, it unfortunately dealt with a subject which could not be presented with scientific exactitude. He would like to know why the author excluded the consideration of the possible bad effect upon the stomach of the swallowing of the irritating secretions from the nasopharynx, when he was at the same time contending that the irritation from the stomach caused so much mischief in the nasopharynx. Personally he was disposed to think that gastro-intestinal trouble arose

from the condition of the upper air passages, and not that the reverse was true.

Dr. C. F. Thiesen emphasized the need for great general knowledge among specialists, quoting Virchow's comparison of the specialties to the offshoots of a tree, the trunk being general medicine.

Dr. Coffin closed the discussion. He said that he had endeavored to eliminate toxemia from the paper, and hence the throat, which was benefited by the administration of calomel, was not the kind of throat that he was trying to describe. The subject though old did not seem to him to have attracted the attention that it merited. In reply to Dr. Cobb's very pertinent question as to the ultimate results, he would say that the cases sent to the stomach specialist had been selected, because there was a practically normal structural condition of the nose and throat. He was particularly interested in the remarks made by Dr. Thompson concerning the cases of diminished acidity, for he had not been able to gather sufficient evidence about these cases.

SECOND DAY.—FRIDAY, MAY 1ST.

Symposium.—Otitis Media Suppurativa.

Dr. Norval H. Pierce, of Chicago, opened this symposium with a paper on the Etiology and Pathology. He said that whether the type were catarrhal or suppurative, pathogenic micro-organisms played an important part. The micro-organisms most commonly met with were the streptococcus, the staphylococcus and the diplococcus pneumoniae. Pure infection was the exception rather than the rule; the staphylococcus pyogenes was the organism most often found in pure culture. It was said that infection might reach the ear through the *fissura petrosa squamosa*. The same organism under different circumstances might give rise to different types of inflammation depending upon the virulence of the organism and their number, the resistance of the tissues and the rapidity of invasion. In considering the pathology one should remember that the mucous membrane of the ear served the double purpose of mucous membrane and periosteum, that the glandular element was scanty as compared with

mucous membrane elsewhere in the body, and that the mucus was largely liberated by the pavement epithelium. This explained the tendency of inflammation of this to result in necrosis, there being a rapid multiplication of white cells, thus impairing the nutrition of the bone, derived from the muco-periosteum.

Etiology, Symptomatology and Pathology of Otitis Media Suppurativa Chronica.

Dr. Charles W. Richardson, of Washington, D. C., presented this paper. He said that the most frequent causes of the chronic variety were: (1) Improper treatment of the first stage; (2) certain types of constitutional invasion, such as scrofula, tuberculosis, syphilis, anemia and marasmus; (3) the occurrence of an acute suppurative otitis in the invasion of certain acute infectious diseases; (4) differences in the virulence of the bacilli present; (5) local changes excited at the time of invasion or during the progress of the case, e. g., the development of granulation tissue, caries of the ossicles or tympanic wall and retention of the discharge, and (6) local changes in nasal and nasopharyngeal cavities. Caries, with necrosis of the ossicles, was the most common bone lesion in this disease. The stapes was rarely affected. The carious process might extend to the walls of the tympanic cavity, especially that portion formed by the auditory plate of the temporal bone. The membrane was almost always destroyed to a greater or less extent. The mucous membrane of the Eustachian tube, like that of the tympanic cavity, became infiltrated. The changes in the mastoid during chronic suppuration were: (1) Congestion, swelling and polypoid degeneration of the lining of the antrum and mastoid cells, (2) complete obliteration of the mastoid cells; (3) osteosclerosis of the mastoid; (4) accumulation of mucopurulent or purulent secretion in the antrum and mastoid cells, and (5) the formation of cholesteatoma. The most characteristic symptom of chronic suppuration of the middle ear was the presence of a discharge. Pain was infrequent in this variety, though it might result from interference with free escape of pus. There was often a feeling of pressure or headache. Subjective noises were occasionally present, but were seldom

continuous. Patients frequently heard fairly well so long as there was a free discharge, and they frequently became quite deaf when the discharge became scanty or ceased altogether. One perforation of the drum membrane was the rule, although occasionally multiple perforations were seen. The membrane might be dull white or yellowish red. The border of the perforation was usually more highly colored than the rest of the membrane. The periphery of the perforation might be adherent at one or more points to the tympanic wall. Granulations or polypi sometimes developed upon the tympanic wall. When the discharge was so limited as to form hard blackish crusts, due care should be exercised in the removal of the crusts, as their base might bleed and obscure the view.

The Inefficiency of the Wilde's Incision.

Dr. J. M. Ray, of Louisville, read this paper. Citations were made from various authors to show the revulsion against the use of the Wilde's incision, because of its inefficiency in the great majority of cases, and this fact was emphasized, because, as the author said, many of these cases were operated upon by general practitioners or general surgeons, who were not aware of the change of opinion that had taken place among otologists regarding this procedure. Any operation which did not open up a communication with the middle ear and give free exit to the pus, was an unsurgical procedure. The prolonged use of hot applications often resulted in an external otitis or masked the symptoms and led to an operation in cases in which no surgical interference was necessary. The large majority of cases of acute suppuration in children were treated by the so-called internal Wilde's incision, but the fact could not be too strongly emphasized that the antrum was involved in almost every case of acute suppuration of the middle ear. The opening up of the one cell communicating with the tympanic cavity was absolutely necessary.

Treatment of the Complications of Otitis Media Suppurativa.

Dr. James F. McKernon, of New York, read this paper. He

said that in aural surgery, as in other departments of surgery, success depended very largely upon the employment of asepsis. A careful examination of the nose and nasopharynx should be made and any obstructions present removed. For the lesions found in the drum membrane, the cardinal principle was to maintain cleanliness of the parts and apply an astringent solution, such as nitrate of silver solution in varying strength, following this by insufflation of powders. Still later catheterization and vaporization of the Eustachian tube were useful in adults, whereas in children the Politzer bag should be used. It was found very useful to temporarily close the opening in the drum by means of collodion or a bit of thin paper held in place by vaseline. Thickened and edematous mucous membrane could be reduced by the use of warm saline solution or the application of astringents. If the mastoid were diseased, the radical Schwartze-Stacke operation should be done. It was rarely necessary to remove the stapes, and care should be taken not to disturb its relations to the oval window. The incus was the ossicle which was usually first attacked, because of its limited blood supply. After the removal of the ossicles the tympanic wall and vault should be carefully curetted, so as to remove all diseased tissue, particularly around the orifice of the Eustachian tube. This having been done, the cavity should be wiped dry and packed with a wick of iodoform gauze. The latter should be removed after twenty-four hours, and then the parts manipulated thereafter as little as possible. Diffuse external otitis frequently occurred in the course of an inflammation of the middle ear. Free incision followed by curettage and drainage would give relief more quickly than palliative treatment. This condition was prone to occur in groups rather than singly, and repeated incisions were sometimes required. When there was tenderness over the mastoid an ice coil should be used for twenty-four hours, and the auditory canal should be irrigated with warm bichlorid solution of a strength of 1 to 8,000. If at the end of twenty-four hours there was no diminution in mastoid tenderness, the ice coil should not be persisted in; but if the tenderness had diminished, it was justifiable to continue the ice coil for twelve hours more. Sometimes the application of dry heat answered the same

purpose, but neither cold nor heat should be applied to the mastoid if the case were of several days' standing, or if edema were already present. If it became necessary to do the radical mastoid operation, it should be remembered that a softening of the bone at the root of the zygoma often demanded attention. If any areas of the dura were exposed, they should be separated by packing, to guard against the possibility of subsequent infection. To make the primary dressing comfortable to the patient and easy of removal, a piece of sterile rubber tissue, button-holed in places, should be first introduced, and then the gauze dressing over this rubber tissue. Ordinarily the first dressing should not b removed for five or six days.

Subperiosteal Abscess.

This was often met with in neglected cases in children and occasionally also in adults. Not only should the abscess be evacuated, but the mastoid process should be opened up.

Adenitis.

Adenitis occurred very frequently following suppuration of the middle ear. It was often relieved by hot applications or the use of some such ointment as the ammoniated mercury. If the glands appeared to be breaking down, they should be removed under anesthesia.

Pachymeningitis.

Pachymeningitis was the most common among the intracranial affections arising in chronic middle ear suppuration and usually accompanied mastoiditis, sinus thrombosis or brain abscess.

Epidural Abscess.

In cases of epidural abscess, a piece of gauze should be placed over the dura at operation, and removed on the third or fourth day.

Sinus Thrombosis.

The lateral or sigmoid sinus was most frequently affected in connection with pachymeningitis around the sinus. Each

individual case was a law unto itself. There must be complete and thorough exposure of the sinus, followed by flushing of the field with alcohol before opening the vessel. The part usually opened was that above the bend, the anterior wall being incised with the scalpel. The use of the aspirating needle had been discarded, because it often gave a wrong impression of the condition existing within. If a large clot were present, it should be removed with the curette and the hemorrhage allowed to continue for a few seconds to remove septic material. The hemorrhage was then controlled by a packing or gauze. In about one-half of the uncomplicated cases the circulation could be restored at the bulb. If much time were consumed in efforts to restore the circulation, it was better to desist. If the sinus did not contain pus, and there was no evidence of jugular involvement, the operative field should be cleansed and the sinus packed at the bulb without making further efforts to restore the circulation. The lower end of the sinus at the bulb should be exposed.

Thrombosis of Internal Jugular Vein.

If, on opening the sinus, there was a discoverable clot, the vein should be resected, and the same should be done if other veins were found to be similarly affected. The pneumogastric nerve should be carefully separated from the vessel. The wound in the neck should be sutured to within a small distance of the bulb and a wick drain inserted for the first forty-eight hours. It should be remembered that time was necessary to overcome the general infection, even though the source of this infection had been eradicated. The inferior petrosal sinus was frequently thrombosed in connection with the bulbous portion of the sigmoid sinus. A thrombosis of the cavernous sinus was almost invariably fatal.

Brain Abscess.

About 57 per cent. of all cases of brain abscess were otitic in origin. The most common site for subdural communication of pus was the inferior and posterior portion of the temporosphenoidal lobe. The roof of the mastoid antrum and the floor of the middle fossa were removed. A sufficient exposure of the dura was essential, and all bleeding points

should be controlled. When there was a collection of pus just below the dura the latter should be incised sufficiently for exploration, care being taken not to cut any large dural vessel. A silk suture should be passed through each flap for the purposes of retraction. An aspirating needle of large size could be used for exploration of the brain. When pus was found a sufficiently large opening was made to admit of the removal of the pus. The cavity could be cleansed by gentle irrigation with warm saline solution or by gentle mopping with ganze. The less the manipulation and the more rapid the operation the better the chances of success. Drainage could be secured by tubes or gauze wicks. The latter he preferred, using a wick covered with equal parts of a powder of boric acid and iodoform. When it was desired to explore the temporosphenoidal region, first the bone should be removed at a point one inch and a half above, and the same distance behind, the bony meatus:. In all cases in which the pus was not definitely localized before operation, it was best to make use of the flap operation devised by Dr. E. B. Dench. The skull should be entered rapidly by the trephine or chisel, a free opening being secured. The utmost care should be exercised in searching for multiple abscess cavities. The principal point to bear in mind was that the skull should be entered at a point as nearly as possible to the floor of the lobe to be explored in order to secure free drainage. Another point was to limit the injury of the dura as closely as possible. The cerebellar lobe could be opened in the same manner as described in other regions of the brain; ordinarily the opening should be made at a point one inch and a half behind the bony meatus and one-third of an inch below this level.

Meningitis.

When meningitis was present, and it could not be localized, little could be gained by a surgical procedure. An ice cap should be applied and large doses of iodide of potassium given internally, A meningeal complication was almost always fatal. Leptomeningitis was almost invariably fatal yet it would seem rational, when exercised early, to explore and drain the region. Metastatic abscesses in different parts

of the body should be treated according to general surgical principles. Metastases of the intestinal tract should be treated by the internal administration of large doses of bichloride of mercury. He had seen this treatment succeessfully employed in several cases.

Facial Paralysis.

Facial paralysis following middle ear suppuration was not uncommon. The pressure should be removed by incision and warm irrigation, the patient being kept completely at rest, on a fluid diet and subjected to purgation. The use of the interrupted galvanic current would hasten the restoration of unction of the nerve. When paralysis occurred several days after an operation for the removal of dead bone, it could be explained either by concussion at the time of operation and inflammation existing later, or by destruction of the facial branch of the chorda tympani. When the paralysis occurred immediately after an operation on the middle ear the presumption was that the nerve had been severed, and one should not expect rapid restoration of function. Of course, if the divided nerve could be found, it should be repaired by suture.

Labyrinthian Affections.

The surgical part of the treatment of labyrinthian affections should consist in the removal of all pressure. The local treatment consisted in placing the patient in bed and administering pilocarpin hypodermically in full doses for a week or more. If the patient could not be kept in bed the drug should be given by mouth. Potassium bromide should be given in full doses for the relief of the very annoying subjective signs. The upper respiratory tract should receive attention if needed. If both sides were affected. very little benefit would follow any method of treatment. He had met with little if any success from the vibratory treatment in such cases.

Cholesteatomata.

The treatment of cholesteatomata consisted in the entire removal of the mass. The safest method was to do a typical

Stacke operation, which allowed of the complete removal of the disease.

The Technique of the Radical Operation for Otitis Media Suppurativa Chronica.

Dr. Edward D. Dench, of New York, was the author of this paper. He said that it was imperative to shave the head for three inches around the ear. Women objected strongly to this, but it should be done nevertheless. The field of operation should be sterilized in the ordinary way, and an antiseptic dressing applied until the time of operation. The initial incision began one-quarter of an inch behind the insertion of the lobule and run upward and backward in a curved line, and was then carried upward and backward behind the line of auricular attachment to a point just above the apex of the auricle. It was then carried forward and downward. The incision must extend well forward in a horizontal direction in order to make a complete exposure of the upper portion of the bony canal, and thoroughly remove the outer wall of the tympanic vault. The anterior flap should be pushed forward so as to expose the posterior and inferior margins of the bony meatus. With a narrow blunt dissector, the fibrocartilaginous canal was then carefully dissected out. Ordinarily the fibrous meatus could be preserved for one-eighth or one-third of an inch. The surgeon should then enter the mastoid antrum. When it lay deeply. and this was usually the case, the funnel-shaped opening should be enlarged by removing the cortex from below and even by invading the posterior portion of the bony canal. This allowed of better inspection of the apex of the canal. It was incised to broaden the funnel above. When the probe entered the antrum and passed through the cell into the tympanic vault one could judge of the size of the antrum. The opening in the antrum should then be enlarged with the gouge so that the inner wall could be seen, The fibrous meatus should then be divided posteriorly close to the tympanic ring. A strip of sterile gauze should be inserted through the meatus and brought out through the incision in the posterior portion of the canal, and the two ends tied together and used as a retractor. This would pull the

funnel-shaped external meatus and detach the auricle well forward. The next step was to break down this partition between the mastoid antrum and the external auditory meatus. This was best done by chiseling upward. As the wound was deepened above, the portion of the external wall of the attic formed by the junction of the posterior and superior walls of the meatus, would come into view. This should then be removed with the gouge, exposing the aditus and antrum. As soon as the prominence in the horizontal semicircular canal came into view the operation should make one large cavity of the parts exposed. The posterior meatal wall must be cut down until it lay on a level with the tympanic cavity; then the niche of the round window could be easily seen. All diseased bone should be removed, but only such pneumatic spaces should be obliterated as were diseased. After the bony cavity had been thoroughly curetted, attention should be paid to the Eustachian tube. A small curette should be passed into the tympanic orifice, and any softened bone removed. The walls of the cavity should then be smoothed off with a burr, and then a firm packing of sterile gauze inserted. The posterior wall of the fibrocartilaginous meatus should be split so as to form two triangular flaps for covering the exposed parts above and below. The process of repair could be materially hastened by the application of Thiersch grafts taken from the patient's left thigh. These grafts should be one inch and a half by two inches and as thin as possible. A sponge should be held in such a way as to prevent any oozing of blood into the bony cavity during the application of the grafts. Sometimes it was necessary to make use of hot saline solution. The application of the graft should be made rather quickly in order to secure complete and deep adaptation of the graft to the bony wound; if done slowly the deeper part of the wound would fill up with blood. The grafts were held in place by judicious packing with pledgets of cotton dusted with aristol. These pledgets hold the grafts firmly against the bony walls, and thus allowed of the use of the needle to smooth out the curled up edges of the grafts. Experience had taught him that no harm was done if the edges of the graft happened to overlap each other, or even the cotton pledget. A strip of sterile gauze was applied over

the pledgets and brought out through the meatus. The posterior wound should then be closed by suture. The first dressing should be changed on the eighth day, unless there were special indications for an earlier dressing. The whole cutaneous wound would usually be found united at this dressing. At this time the strip of gauze and one or two of the cotton pledgets should be removed. A foul odor was often present, due to the sloughing of the overlapping portions of the grafts, but this did not indicate any failure of the operation. The pledgets were gradually removed at the subsequent dressings; at the time of the operation the number of pledgets introduced must be recorded with the history of the case. Out of 28 such operations, 16 of primary and 12 of secondary grafting, 26 had been cured, and 2 cases were still under treatment.

Some Unusual Mastoid Cases.

Dr. H. Bert Ellis, of Los Angeles, read this paper. The first case reported was one entering hospital on September 14, 1902. At the time the patient was more or less irrational talkative and sémi-comatose. The mastoid antrum and cells were opened up and within a week the patient was rational, and she ultimately recovered with perfect hearing. The case was remarkable, because of the degree of mental disturbance and the small amount of disease. The second case was that of a woman of forty-eight, seen last October. She came to him because of a right-sided facial paralysis, which had suddenly developed one week previously. The mastoid antrum and cells were opened up, but no pus found. A few days later acute suppuration of the other ear developed, but was checked very quickly. In sixteen days the patient returned home without any paralysis. The third case was a Chinese boy of seven months. The disease had been rapid in its onset although there was no history of previous middle ear disease. Extensive bony destruction was found. In the next case a girl of four years was operated upon under difficulties, a double mastoid operation being done in a greatly enfeebled child, who became almost pulseless before leaving the table. Nevertheless recovery was satisfactory. The next case, one of paralysis, occurred in a woman of thirty. At the opera-

tion the cells and antrum were apparently healthy. They were converted into one cavity. The paralysis disappeared, but he was disposed to think there was no direct connection between the two. In the next case the external swelling was marked, and there was decided acute periostitis with necrosis, and yet no involvement of the antrum and cells.

Two Cases of Thrombosis of the Jugular Bulb; Ligation of Internal Jugular.

Dr. Norval H. Pierce, of Chicago, reported these cases. The first case was one of isolated primary thrombosis of the jugular bulb. The patient was a woman of thirty-seven years with a chronic discharge from the left ear. On admission, January 3, 1903, there was pain in the ear; the temperature was 101° F. and the pulse 112. The next day the temperature was 103° and the pulse 130. The discharge was profuse and the pain very severe, and there was infiltration and marked tenderness over the mastoid. A radical operation was done, and the mastoid cells were found necrotic and full of pus. Necrosis of the bone on a level with the floor of the middle ear was fonnd extending inward toward the bulb. The patient's condition was such that no further operative interference was done at that time. Her condition grew worse, and on January 6 the sigmoid sinus was explored with negative result. The common jugular was tied on the following day, as grave septic symptoms continued. Afterward there was marked amelioration of these symptoms, but they again reappeared with exophthalmos and edema of both supra and infra orbital regions. Death occurred on January 14. The specimen was exhibited, and showed that the thrombus had extended up the inferior petrosal sinus to the circle of Ridley and thence to the ophthalmic veins.

The second case occurred in a man who had been operated upon a month previously for acute mastoid trouble without external evidence. The most prominent symptom was severe pain, especially over the occiput. He had had a chill the evening before, and on admission had a temperature of 103° F. On exploration it was found that the antrum had been thoroughly opened up previously. On chiseling away the mastoid he suddenly came upon a perisinus abscess, but

as there was no external evidence of sinus thrombosis the sinus was not opened at this time. The next day there was chill and a rise in temperature, and the sinus was then opened. It was exposed backward and then downward toward the bulb. The common jugular vein was tied. The temperature continued more or less elevated for the next three weeks, and during this time the pain persisted. The retinal changes which had been present before operation persisted, and when seen many months later one eye was still unchanged. He was confident that the thrombosis had extended up the inferior petrosal sinus, causing secondary thrombosis of the jugular bulb. In his opinion, it was not at all necessary to approach the jugular bulb itself through a bony passage.

Dr. E. B. Dench said that unless it could be demonstrated that there was a very free flow of blood through the sinus the latter should be opened at the primary operation. In a recent case the sinus was covered with pus,and yet the sinus itself appeared to be normal and he was about to refrain from opening it; nevertheless he did open the sinus and found there a thrombus. A delay of twenty-four hours represented the loss of very valuable time. He did not think the puncture of the sinus was of much value as a diagnostic aid. He had not seen a single case in which the incision of the sinus under aseptic precautions for exploratory purposes had been followed by an unfavorable result. Having opened the sinus and found nothing, he would pack the sinus with iodoform gauze and isolate the sinus with gauze. The sinus was destroyed, but this, he thought, was better than waiting twenty-four hours. He preferred the use of iodoform gauze to steri e gauze in cases in which the normal sinus was surrounded by suppuration. He had not observed any trouble from hemmorrhage after the first dressing.

Dr. Pierce said that all of the symptoms of pronounced septicemia could be obtained from necrosis of the mastoid cells themselves, and that one could not tell from the course of the disease whether or not the sinus was involved. Even after having exposed the sinus for considerable distance it was difficult to say whether or not there was a thrombus which occluded the sinus entirely. For these reasons he felt justifiable to wait from twelve to twenty-four hours rather

than perhaps needlessly sacrifice the sinus. He had opened up the sinus in one case and had found absolutely nothing, and the patient had died a few days later. There was some hemorrhage on the removal of the first dressing, but it could be readily controlled by pressure with gauze. If fever and chills persisted he felt that the sinus was in all probability involved, and he would then open the sinus.

Dr. Dench, in answer to a question by Dr. Richards, said that if any of the tributary veins were left the infection might be washed through them. Experience had shown that the more completely the tributaries were tied off the better were the result.

Dr. W. C. Phillips referred to a case in which there was very extensive necrosis. He had exposed not only the sinus, but the cerebellum, and a portion of the cerebral fossa. On opening the sinus there was a tremendous hemorrhage, which could not be controlled by any ordinary gauze pressure. After very great loss of blood he controlled the hemorrhage by making a cork of gauze. At the time of the first dressing he took precautions against a recurrence of the hemorrhage, nevertheless it occurred and was very profuse. Difficulty was again experienced in controlling it, because there was no bone for counter pressure.

The Technique of Maxillary Antrum Operations.

Dr. H. Holbrook Curtis read this paper. He said that the fisrt thing was to determine whether a second bicuspid tooth or molar tooth was the cause of the disease, and whether the discharge was acute or chronic. Irrigations through the natural orifice should be given a trial. If the natural orifice could not be used, and a tooth were suspected as the cause, then a tooth should be sacrificed and the opening utilized for the irrigation. It was quite easy to make obturators of varying shapes out of guttapercha. A sheet of guttapercha was dipped in boiling water, wrapped around a pencil and, after having been properly shaped, held in cold water until hard. An excellent irrigating fluid was composed of iodin, one drachm, pyrogallic acid, half a drachm and a saturated solution of boric acid sufficient to make one quart. The alveolar puncture was made for inspection, not for drainage.

If the tooth were not suspected other modes of entrance should be sought. Too many specialists were content with making an opening in the canine fossa, and then employing irrigation. In acute cases this might prove sufficient, but in the more chronic ones, it was absolutely necessary to thoroughly inspect and explore with the object of determining the exact pathologic condition present. When a radical operation had been decided upon the patient should be told that the length of time consumed in effecting a cure was very problematical, but that after a short time he would be comfortable and could attend to much of the treatment himself. The periosteum should be divided and turned back, and a chisel used to enter the antrum. The opening should be made sufficiently large to allow of the entrance of the bone forceps, and with the latter instrument the fenestration was completed. Strong carbolic acid and alcohol should be successively applied. The cavity could be still further cleansed by means of peroxid of hydrogen followed by normal saline solution. A gauze packing was then employed. After the granulation process had become well established, worsted should be substituted for the gauze, because it could be introduced through a smaller opening. After from two to four weeks the worsted packing could be stopped and the peg could be inserted. This method was capable of giving good results, but often failed. A better operation was that in which, after making the fenestration as already described, an opening was made into the nasal fossa. The larger the nasal orifice the better would be the result. After the bleeding had been arrested the antrum should be lightly packed with gauze or wool, and the wound in the canine fossa closed by two or three sutures. The packing should be removed, preferably under anesthesia, and if there was a foul discharge the antrum should be washed out. The opening in the canine fossa need not be so large in this as in the preceding operation. The operation through the inferior meatus was advantageous, because it required no anesthesia. It was, therefore, particularly applicable to patients who were not good subjects for anesthesia. With the electric trephine the anterior third of the inferior turbinate should be removed. The perforation should be made about one quarter of an inch above the

nasal floor. The fenestration should be made very smoothly.

The Report of an Unusual Case of Frontal Sinusitis.

Dr. Cornelius G. Coakley reported this case, one in which there was an absence of a septum in the frontal sinus. The patient was a woman of sixty-two, who had previously enjoyed good health, except for an attack of grip in 1890. In July, 1899, she began to suffer considerably from frontal headache, which ceased in a few weeks. In January, 1900, there was a swelling noticed about the right eye, and the eye was displaced downward. On January 28th it ruptured spontaneously, and discharged thick and slightly offensive pus. There was no discharge in the posterior nares. In October of that year she consulted the late Dr. W. B. Noyes, who advised her to return home for a radical operation on the frontal sinus. The fistulous opening was enlarged and a portion of the right frontal sinus was removed and the cavity curetted. No drainage tube was inserted in the naso-frontal duct. After some months packing was discontinued, and simple irrigation employed. The irrigation treatment was continued daily for about one year. She then came under the speaker's care, i. e., in January, 1903. The fistula was still present, and a probe, passed between the outer wall and the middle turbinate, encountered a small polypoid mass, which bled freely. The mucous membrane of the left nasal cavity was normal. Transillumination of the antrum gave perfect illumination on each side. Both frontal sinuses gave practically no illumination. The right middle turbinate was removed under cocain. The underlying ethmoid cells were found filled with pus and granulations. These were all cleaned out and the catheter was passed into the right frontal sinus. The patient was advised to have the left frontal sinus explored first, and this was done On January 4, 1903, under chloroform, an incision was made and the sinus opened. Thick pus escaped. The opening was enlarged until all parts could be explored by direct illumination. A similar opening was made in the anterior wall of the right frontal sinus. No trace whatever of a septum between the two sinuses could be found. Every trace of mucous membrane was removed from the frontal sinus cavity. There was a median posterior offshoot, and

this gave no little concern. The entire cavity was packed with strips of iodoform gauze, and this packing was not removed for two weeks, there being no discharge and no elevation of temperature. The probe then detected no dead bone. Irrigation showed the naso-frontal duct to be occluded. The cavity was wiped dry and repacked, and therafter at intervals of about one week the packing was changed without irrigation. A remarkable feature was the fact that the total quantity of discharge did not amount to three drachms. The interesting features, aside from the abscess of the septum, were the very large size of the sinus and its healing without any osteoplastic operation.

Dr. G. L. Richards opened the discussion on the preceding papers. He said that he had had one case of double frontal sinusitis on which he had operated at two different times, and had in time been able to establish communication between the two. In a recent case the probe passed upward, and considerably beyond the median line.

Dr. L. A. Coffin referred to a recent case in which there had been no objective symptoms, but the boy had been brought to him because of the bulging of the forehead. He opened the right side first, supposing there was a double sinusitis. The bone was found to be as thin as writing paper, and the sinus was filled with pus. A small sequestrum of bone was found in the sinus, and in probing, he thought the instrument passed through the septum. On opening the other side he found a perfectly healthy sinus, and he could discover no communication with the right sinus. On removing the dressing on the second day the left sinus was found to be entirely healthy. Whether or not the sequestrum was merely the septum between the large sinus and what appeared to be an accessory sinus, he could not say, but the probe passed almost to the middle of the left eye. A week or two ago a laboring man had presented himself with a fistula, as in Dr. Coakley's case. An early operation would have prevented him for some time from earning his living, and hence, the speaker contented himself with taking off the entire middle turbinate, curetting the ethmoid cells and establishing good drainage. This relieved the pain.

Dr. Chevalier Jackson, of Pittsburg, said that his lamp

would show the septum in the frontal sinus if the sinus were normal. Where transillumination showed a diseased lining in the maxillary antrum he did not feel satisfied with a mere examination with the probe, and for that reason he made an opening in the canine fossa sufficiently large to admit the finger for examination and for breaking down any septic focus that might be present. To keep the opening patent for some time he made use of a small canula made of malleable metal, and after its introduction it was expanded by means of an alligator forceps, and was thus retained. It could be removed with slight force and without doing any harm to the tissues.

Dr. Price Brown asked Dr. Curtis if there were any age limit after which he would not do the radical operation for antral disease, and if in an aged person he would do the operation in the anterior meatus or in the canine fossa.

Dr. Thomas Hubbard, of Toledo, said he had used gutta-percha in some cases, and had found it very poor material unless the plugs were changed very often, because it retained septic matter and exuberant granulations formed. By vulcanizing and polishing the material it was rendered less likely to retain septic matter.

Dr. C. G. Coakley said he had been deeply interested in Dr. Curtis's paper, because it showed clearly the faults of treatment that was not radical. In his opinion, cases of antral suppuration were not uncommon, particularly after an attack of the grip. He had never seen one of these cases in which the diagnosis had been made by actual puncture and washing that had not recovered after a few washings. His present treatment was to wash out the antrum every other day with normal saline solution, and blow out afterward any remaining fluid. He was not referring to cases arising as a result of disease of the pulp of the teeth, for they did not do so well under washing. He had never felt that he could approach these cases through the middle meatus because this opening was ordinarily so completely covered with the middle turbinate. For this reason he cocainized and made the puncture at the outer wall. In cases in which antral disease was suspected he did not hesitate to puncture, for, if done under aseptic precautions, it was attended by little or no risk.

Dr. Norval H. Pierce said he still claimed that the antrum could be reached occasionally through the natural opening. It was difficult, if not impossible, to get through the natural ostium in a natural position when the turbinate was of normal size, but in these cases of antral disease accessory openings were frequently present, as had been proven by Zuckerkandl. It was probably through those that one gained entrance to the antrum. He believed that it was good practice to make an attempt to enter through the natural opening before resorting to puncture.

Dr. Fred. C. Cobb, of Boston, said that the dentists seemed to have great difficulty in detecting bad teeth and differentiating them from good teeth, and hence one could not reply upon their decision in deciding upon making an operation. The washing out certainly relieved the pain, but he questioned whether it materially shortened the duration of the disease. He also doubted the efficacy of curetting the mucous membrane, because when the antrum became a reservoir for pus a polypoid condition existed in this cavity, and the condition was cleared up when the ethmoid was treated.

Dr. Curtis did not understand that Dr. Coakley had advanced arguments in support of the opinion that the septum had not been destroyed. He recalled one case in which by merely touching the septum with a probe the instrument passed through, showing how easily a solution of continuity of the septum could be produced. With regard to age limit, he would say that the third operation described was particularly appropriate for aged people. He did not vulcanize the guttapercha tubes, but if the patient were going away for some time he had the tubes finished up in this may by his dentist. The point made about vulcanizing them was a good one. He had experienced no trouble from retention of septic matter in the guttapercha. The test by heat and cold often enabled one to detect disease of the teeth.

Dr. Coakley said he had several cases of double empyema without communication from the sinuses. Mention had been made of secondary cavities, and it was well known that they not infrequently existed and constituted a bugbear in operating; for this reason a sufficiently large opening should be made in the anterior wall to make sure that such peculiari-

ties were not overlooked. He did not doubt that an opening might have been made in a septum under the tension that must have been present, but in his case there was absolutely no trace of any septum having existed, and the sinus itself was very large. He had just learned from Dr. W. C. Richardson that he had opened up a sinus in which a septum was present, and at a second operation he had found the septum entirely gone.

THIRD DAY.

The Eustachian Bougie; Its Use and Abuse.

Dr. M. A. Goldstein, of St. Louis, read this paper. He said that in 1865 rubber had been substituted for catgut, and the bougie was passed entirely by the sense of touch. To-day, the celluloid, whalebone or electrolytic cold bougie was employed. It was often impossible without a bougie to determine accurately to what extent the catarrhal process in the middle ear had progressed. With the bougie one was enabled to outline the entire track of the tubal canal, and by the educated tactile sense determine the exact location of any construction of the tube, and even ascertain the character and consistency of the tubal stricture. He believed the bougie should be used as regularly in every case of otitis media chronica as ocular inspection of the membrana tympani inflation. He had used the bougie liberally during the past ten years, and it had been his experience that the technique was not more objectionable to the average patient than the use of the catheter and inflation. He made use of the cold polished whalebone bougie in various sizes. By means of graduated olive-tips one could determine the calibre of the tube. As the normal average diameter of the isthmus tubii was 1 1/3 mm., it was not necessary to use a bougie of larger calibre than that designated as a five-thirds bougie, it was evident that the bougie was passing in a wrong direction. If the bougie were not in proper position deglutition would cause it to shift. If, on withdrawal, a decided kink was noted at the distal end of the bougie, it was an indication that the bougie was passing between the tip of the catheter and the pharyngeal wall, and had not entered the tubal canal. If the

patient complained of a scratching or sticking in the pharynx, going more deeply as the bougie was pushed forward, it was evident that the bougie was not entering the canal. As the bougie passed the isthmus tubii, the patient often complained of a sudden unpleasant sensation in the ear. Force should never be used in passing the bougie. If the tip of the instrument became engaged in one of the folds it was easy to produce a false passage if any force were employed. When such a break took place, a local emphysema was liable to be produced by subsequent inflation. The value of the use of the bougie was generally increased by immediate inflation of the tympanic cavity upon the withdrawal of the bougie, although in individual cases it caused increased discomfort. In such cases it should be omitted. The author was of the opinion that the bougie was of inestimable value, not only when there was a decided stricture of the tube, but when the calibre was diminished to less than 1 1/3 mm. The bougie here should be passed the full length of the Eustachian tube and left for a time varying from one to ten minutes. The first application was usually the most uncomfortable to the patient. The introduction of the bougie should be repeated every second or third day unless there was some unpleasant reaction, and the size of the bougie should be gradually increased up to No. 5. Perhaps the most frequent contraindications to the use of the bougie were a feeling of fullness and dullness in the ear and an increase in the subjective symptoms. The period of treatment was not usually over six weeks. Marked improvement was sometimes noticed after the first or second passage of the bougie. He had found the bougie occasionally of value in chronic suppurative otitis media. It was reasonable to believe that the use of the Eustachian tube bougie would prove of value in cases of subacute catarrhal affections characterized by the presence of thick or stringy mucous. With regard to the use of the electrolytic bougie the speaker said that one of the advantages of this instrument was the effect of galvanism, and another was the ease with which the instrument could be made to pass certain strictures which were impassable without such aid. He had used this bougie with from three to five milliamperes in 50

cases, and had obtained no better results than could be secured by the use of the ordinary whalebone bougie. Undoubtedly the instrument could be made to pass more easily, but there was apt to be a tendency for the stricture to return. The action of the current in such cases was not, in his opinion, true electrolysis, but rather a mild surface cauterization of the mucosa of the Eustachian tube.

The Possibilities and Limitations of the Electrolytic Bougie in the Treatment of Chronic Hypertrophic Catarrhal Deafness.

Dr. Arthur B. Duel, of New York, was the author of this paper, which, in his absence, was read by the Secretary. He had sent a circular letter to the members of the society, asking for their experience with this mode of treatment. Of the 25 replies, 2 stated that the method had been found of no value; 17 were of the opinion that the tubes could be more quickly opened; 9 reported the breaking of the bougie in the tube. The replies seemed to indicate that there had been a lack of care in attending to the original source of the trouble, and a lack of judgment in the selection of the cases suitable for this treatment. Experience has shown that the tube could be opened more quickly and more permanently than by any other method. Injury to the chorda tympani nerve had occurred in 3 of his own cases, and so far as he knew in no others. The wires should be made with great care, and should be inspected each time before use. Many of the diverse criticisms were thought to be founded on purely theoretical considerations. The galvanic current exerted a powerful resorptive effect. The author said he had found it of the greatest value only when it had been used but a few times. Dobell's solution should be used to wash out the nose and nasopharynx, and again, cocainization of the parts should be resorted to before employing the electrolytic bougie. Bubbling sounds indicated that the bougie was rapidly passing through the stricture. Then a second or third obstruction would be encountered. The bougie should invariably be passed on into the tympanum. At intervals of a minute an additional milliampere of current might be turned on up to five minutes, and if then the obstruction could not be over-

come, further treatment should be postponed for about one week. Having passed into the tympanum, gentle inflation might be practiced at the end of two days. Sometimes the tube would be so blocked by swelling that inflation could not be practiced, and, of course, while this condition lasted, the patient's symptoms would all be aggravated. The author cautioned against using the method hurriedly and too often, and suggested that this treatment should not be taken up in connection with a busy practice, unless special appointments were made with the patients. So confident was he of the benefit of the treatment that he would feel compelled to continue its use, even though all the other members abandoned it.

Dr. Chevalier Jackson said that it was his opinion that the best method of treating the tube was by leaving it alone and treating the nose and nasopharynx. He had given the electrolytic bougie a faithful trial, and had found no greater relief than from other irritants, and no permanent benefit. The tube opened more quickly, it was true, but the final result was no better.

Dr. George L. Richards said he had practiced the method, and had encountered the breaking of the bougie, but had been unable to fairly understand the reason for the occurrence of this accident. In one case it was broken off at about 12 mm. The patient never knew of the accident, and it gave rise to no discomfort. In another case the bougie had been passed only once, and the result had been permanently good, except that the tinnitus had not been improved. In another case the hearing became worse and the woman suffered from a paralysis of the tear canals on the corresponding side. The method was certainly one which called for careful selection and the use of plenty of time, at least an hour. Ordinarily he employed the treatment from five to ten minutes with 4 or 5 m. a. and 30 volts.

Dr. W. C. Phillips said that for one year his clinic had been used for studying this method of treatment. The one case of mastoiditis reported had occurred in that service in spite of the employment of a very careful technique. However, he thought it could be positively asserted that there were certain cases of severe tinnitus, which were caused by ob-

struction in the Eustachian tube. If the obstruction were mucus, it would be temporary; if due to thickening of the membrane or a stricture, it would be more permanent. If the obstruction could be overcome and air made to pass, it was probable that the tinnitus would be relieved and that the deafness would not increase. He had used the electrolytic bougie on a large number of patients, and while Dr. Duel appeared to be rather enthusiastic over the method, it was capable of accomplishing very good results. He was of the opinion that temporary influence of the current enabled the operator to pass the stricture more easily than could be done without it; but that further than that the electricity was of no value. He commended the treatment solely for this aid given by the current. He had broken off one or two bougies in the tube while carefully demonstrating the method to the class. It should not be employed except by one having an excellent armamentarium and perfect control of the current.

Dr. Sargent F. Snow, of Syracuse, said that he had had no experience with the electrolytic bougie. He had used the hard rubber bougie at one time, and believed its use favored absorption, but in recent years he had abandoned it, because by other and simpler means he had secured equally good results.

He rarely met with a case of chronic catarrh of the middle ear and Eustachian tube that was not due to more than one cause. Almost invariably there was a nasal factor, and it required removal. He seldom encountered a bad case of deafness, unless there was in addition a systemic element. The electrolytic treatment was directed only against the obstruction of the Eustachian tube, and the other factors were ignored. Recent observations had convinced him that in autointoxication, chiefly from the intestinal tract, was to be found a very potent factor in chronic catarrhal deafness.

Dr. W. L. Ballenger, of Chicago, said that one should not overlook the difference between galvanism, electrolysis and cauterization. By galvanism was meant that method of applying electricity so as not to result in an appreciable breaking down of the tissue. By electrolysis was meant that softening effect on tissue, which resulted from the current, but

was not attended by sloughing or abrasion of tissue. By cauterization was meant a more powerful or concentrated effect of the galvanic current, characterized by sloughing or absolute and rapid destruction of tissue. Apparently Dr. Goldstein had confused these terms. In the method under discussion that strength of current should be employed which would produce only electrolysis. Dr. Phillips had declared his belief that the electrolytic effect lasted only during the passage of the current, but this, in the opinion of the speaker, was an error. Certain of the tissues were broken down by electrolysis into their primitive elements, hydrogen gas being liberated at the negative pole. The effects of electrolysis lasted much longer than the passage of the current; probably they lasted for some hours longer, because of the liberation of gases and other chemical products in the tissues. His experience had been that this method of treatment was not of great value, and he based this opinion largely upon the experience of surgeons with electrolysis in the treatment of urethral stricture. Some years ago the method was much in vogue, but at the present date it was but little employed except by those who made a specialty of electrotherapy. Genitourinary surgeons in general were of the opinion that the method was not very reliable, and certainly in the Eustachian tube the conditions for its employment were much less favorable. If the current strength were slightly in excess irritation would result, with the throwing out of cells which would ultimately cause the formation of fibrous tissue and eventually render the condition of the tube worse than before. While, therefore, the method might be used in selected cases, particularly those which were hypertrophies rather than genuine strictures, the danger of the method in the hands of the average practitioner must be such that he would enter a protest against at least any enthusiasm regarding this treatment.

Dr. Dunbar Roy said that he had been using the electrolytic bougie about four years, and before that, and even up to the present time, he had used the whalebone bougie a great deal. The value of the latter was certainly very great, and it was capable of giving equally as good results in the same class of cases as the electrolytic bougie. The personal equation undoubtedly entered very largely into this question, the

determining factor being largely one of delicacy of touch and skill in instrumentation. Dr. Goldstein had said that with the bougie he could obtain a good idea of the state of the mucosa in the Eustachian tube, but his own experience was that when the bougie passed the free end of the catheter leading into the Eustachian tube it rubbed against the wall and made it impossible to determine whether it was rubbing against the catheter or the mucosa. He did not think any living man could tell just when the end of the electrolytic bougie was going to pass into a fold of mucous membrane. He depended entirely upon inflation and auscultation for knowledge of the condition of the mucosa. Every catheter could not be made to pass into the tube, and for that reason he always made use of a malleable silver catheter which could be bent to fit any nasopharynx. Having determined the size of the nasopharynx and the probable distance to the opening of the Eustachian tube, the catheter was bent so that it would just go into the tube; only a little air would pass into the tube. The end of the catheter must fit thoroughly into the end of the Eustachian tube. Regarding inflation after the use of the electrolytic or the ordinary bougie, he would say that he never inflated, because he had had one or two very severe cases of emphysema extending well down on to the neck.

Dr. E. B. Dench said that after a very large experience he could not say that in the majority of cases the electrolytic bougie presented any great advantage over the ordinary bougie. The manipulation with the electrolytic bougie, it was true, was a little easier. He could only recall one case in which the tube appeared to have remained more patent after the electrolytic than after the ordinary method. This was counterbalanced by another case in which, after repeated use of the electrolytic bougie, one treatment by the ordinary bougie gave a permanent result. He, therefore, looked upon the method as a valuable one, but not one which was going to prove curative in any large number of cases which could not be equally well treated by older methods. One great advantage of the simple bougie was that applications could be made directly to the Eustachian tube, and this was of value even after the electrolytic bougie had been used. His own plan was to make use of a cotton-tipped wire dipped in

various medicaments. One excellent clinician claimed th t he had found the electrolytic method particularly useful, because he had met with many strictures at the mouth of the Eustachian tube, and these yielded very easily to the current. Dr. Dench added that he had shown this gentleman that by simply bending his bougie a little more he could pass it easily into the tube without any use of the current, and that by the aid of the latter he had succeeded simply because he had caught and passed through certain folds of mucous membrane at the orifice of the Eustachian tube.

Dr. Goldstein, in closing, said that if the value of the electrolytic bougie was considered to be due to the galvanism, then it was only through its vasomotor action. It was quite probable that this action was valuable. But by the term electrolytic he understood destruction of tissue, either on the surface or under the mucous membrane, and in either case it would result in evil. The question of whether the treatment involved the employment of galvanism or of electrolysis should be settled without delay. The relief of tinnitus, as has been said, was often very marked with the electrolytic bougie when it could not be obtained by the cold bougie, and this he explained by the effect of galvanic stimulation. It was well known that galvanism would relieve subjective symptoms whether used in the Eustachian tube or applied in some other manner to the nervous system of the ear. If the result were only temporary, as appeared from the discussion, then the cold bougie gave practically the same result as the electrolytic bougie. The majority of the strictures occurred at the isthmus tubi, and it was not improbable that the rugae might be responsible, as Dr. Dench had suggested, for many of the brilliant results claimed for the electrolytic bougie. He had not observed any melting of the strictures from the use of the galvanic current in this way.

The Value of Exploratory Puncture of the Membrana Tympani.

Dr. Dunbar Roy, of Atlanta read this paper, reporting the history of two cases. The first case was that of a lady of forty who had always been nervous, and had been treated

previously for what had been diagnosed as "hysterical insanity." When seen by him she was fairly vigorous, and there was nothing abnormal in the nasopharynx. The right ear had normal hearing. The left drum appeared thickened and opaque. The Eustachian tube was open, and there was no mastoid tenderness. Bone conduction was much prolonged. She complained of much pain in the front of the ear. She was put upon increasing doses of iodid of potassium, iodin was used externally, and she was given galvanic treatment. The patient complained of such severe and persistent pain that, a few days later, the left drum membrane was punctured, and this gave vent to some glairy mucus, and gave decided relief. The following day a mucous polyp appeared at the opening, and was removed, and from that time on recovery of hearing and relief from pain were satisfactory. The case was narrated to emphasize the importance of a more general use of exploratory puncture of the drum membrane, a procedure which, if rightly performed, carried with it no risk. Many a mastoid abscess had been prevented by early incision of the drum membrane.

The second case was one of mastoid involvement following acute otitis media, and without the usual symptoms. The trouble had suddenly begun four weeks previously with severe pain in the right ear, and in vertex and occipital region. There was no mastoid tenderness, and the drum membrane on the right side appeared perfectly normal and free from moisture or congestion. Nevertheless the membrane was freely punctured and there escaped a small quantity of blood and mucopus, and accordingly an immediate mastoid operation was done. Considerable healthy bone was passed through, and only a drop of pus was found in the antrum. However, several of the cells were filled with pus, and all of the mastoid was removed to the tip. During the operation there was a profuse mucopurulent discharge from the auditory canal. The next day the patient was very comfortable, and he mmade an uninterrupted recovery. This case illustrated the value of exploratory puncture, particularly in view of the fact that none of the usual indications for this procedure was present.

Dr. M. A. Goldstein opened the discussion on the two pre-

ceding papers. He said that at the meeting of the Middle Section of this society, held last year, he had presented a paper on influenzal otitis, and had discussed there in the value of a liberal incision of the membrane tympani in this type of case before there was even a bulging of this membrane. He had carried out this method in a number of cases with rather satisfactory results. In most of the cases the operation was done during the stage of congestion and while the membrane was retracted. The value of this incision he believed to be undoubted, as it not only gave relief, but provided drainage.

Dr. Clement F. Theisen said that he understood that exploratory puncture was done by Dr. Roy when there was simply a redness of the drum with bulging. There was no doubt that many cases could be aborted by such early incision, yet he believed that there was a certain danger of making this incision unless one was certain that there was fluid in the tympanic cavity, which would probably become purulent. He based this opinion upon the great danger of introducing infection from without. In some of these cases the use of the aural bougies, recommended by Dr. Richards would give relief and abort the case with less risk to the patient. In children, unless general anesthesia were employed, the spear shaped instrument was almost a necessity, because of the rapidity of manipulation demanded.

Dr. Snow heartily commended Dr. Roy's paper, and firmly believed that the general adoption of this method would greatly reduce the number of mastoid cases. He had never known puncture of the drum membrane to lead to any harm, if properly done. He had a case very similar to the last one reported by Dr. Roy. In that one there were symptoms pointing strongly to intracranial mischief, and he had advised immediate operation but could not obtain consent at that time. The next day there was a rupture of the drum, a free discharge of serous fluid, and coincidentally all of the urgent symptoms disappeared. He was now using bromid of ethyl as the anesthetic in connection with the opening of the drum membrane, and found it well suited to these cases.

Dr. Roy said he did not advocate puncture of the drum membrane simply for redness, but he intended to advocate

incision of the membrane without waiting for bulging provided there were symptoms pointing strongly to otitis.

Cases of Pyogenic Brain Diseases Associated with or Caused by Acute or Chronic Nasal Suppuration.

Dr. Thomas Hubbard, of Toledo, presented this paper. The first case was one of ozena with ulceration, osteosclerosis, leptomeningitis and death. The patient was a man of twenty-one with chronic suppuration of the left ear for over ten years. He developed a meningitis of the subacute type, with no unusual ear symptom. He had been using instruments freely for the removal of crusts from the ear. Only a hasty autopsy was possible. This showed the meninges bathed in pus. There was no infection of the temporal region, but the evidence pointed to infection from the nares. The second case was one of suppurative mastoiditis with a cerebral abscess. The patient was a woman of twenty-five who had had earache for many years and had been in the habit of picking the nose with hair pins. She suffered excruciating occipital pain. The autopsy showed the under side of the frontal lobe thickened and adherent by organized plastic lymph. There was an abscess in the centre of the frontal lobe. The patient died from morphin narcosis, but this was not unusual from morphin used in proper doses in such cases. The third case was one of ozena with acute accessory sinus infection and fatal meningitis. The patient was a girl of sixteen. The autopsy showed a purulent meningitis, probably arising from the nares. The fourth case was one of chronic intermittent purulent catarrh with operations on the septum and for adenoids. There was a latent empyema and a fatal meningitis. The patient was a girl of ten years. Commenting upon these cases, the speaker said that he was convinced that ozena was an important factor in such cases, particularly where operations were called for. The prognosis must necessarily be bad. The nares and accessory sinuses should be studied quite as carefully as the temporal bone.

Dr. Price Brown said, regarding the comparative frequency of tic douleureux arising from pressure within the nasal cavity, that when the pressure was circumscribed, as of the middle

turbinate upon the septum, the pressure was apt to be very intense. Frequently there was enormous pressure produced by growths, as for example, when the cavity was filled with polypi, without the causation of neuralgia. He had observed more pain from the pressure of the middle turbinate, but sometimes the enlargement was a compensation for the lower turbinate, and then there was not usually so much pain. In cases of pressure from antral abscess causing pain the latter was spasmodic and occured occasionally, whereas the pain from septal pressure was always continous.

Life Insurance and Diseases of the Ear.

Dr. W. C. Phillips, of New York, presented a paper with this title. He said that he originally intended to submit statistics from the medical examiner of the various life insurance companies, but the results of communications addressed to about 30 of these companies had been very disappointing, with regard to obtaining the desired statistics. It became apparent that whatever rules of any company, the final action was not dependent upon any statistical data. The replies indicated that the companies were anxious to obtain such statistics. Regarding the penalization of applicants who had suffered from acute or chronic otitis media no very definite information could be obtained further than the existence of such penalization. Nearly all of the companies refused or postponed such applicants, while two or three companies accepted such applicants on an extra premium. One company had a substandard class in which they accepted these applicants having ear discharges. Some of the companies accepted these applicants except when the discharge was bloody or gritty, pointing to involvement of bone. The writer then said that Schwarze's statistics pointed to 13.05 per cent. of all cases of aural disease being of the chronic suppurative variety. In three of the large London Hospitals there were 8,028 deaths, in 45 of which death was due to aural suppuration, giving one death to 128 from this cause. Randall, out of 5,000 aural cases reported 15 deaths due to aural suppuration, or one in every 133. In a period of eight years at the Manhattan Eye and Ear Hospital there were 64,858 aural cases out of which there were 218 presenting

serious intracranial complications. Statistics seemed to indicate that the dangerous consequences from suppurative disease of the ear were most frequent between the ages of twenty and thirty. The writer was of the opinion that continuous discharge with foul odor should be looked upon as evidence that the person was a life insurance risk. Large perforations and apparently free drainage, while militating somewhat in favor of the patient, should not be considered as a guarantee against the extension of the necrotic process, Radical operative interference was destined to become an important factor from a life insurance standpoint.

Dr. E. B. Dench said that the paper was of special value, coming as it did from one having large experience in otology. The paper presented facts rather than opinions, so that discussion was not in order except as regards conclusions. He had been surprised, with his increasing experience, to note how frequently a chronic purulent otitis with a large perforation would remain dormant for a period of from one to five years, and would then suddenly develop all of the symptoms of an acute otitis. Formerly he had been of the opinion that when there was a large perforation in the drum membrane and free drainage the patient was quite as free from danger as though there had been no suppuration; but he would change this opinion at the present time, and state his belief that while the person was comparatively safe, he was by no means entirely out of danger. He agreed with the reader of the paper that *probably* the radical operation would remove absolutely all menace to life, even though the discharge had not been absolutely controlled. However, cases of labyrinthian fistula should be excluded here.

Dr. Dunbar Roy said he had greatly enjoyed this paper, and believed it to be in the right direction, because otologists were consulted from time to time regarding applications for life insurance. It had always seemed to him that cases presenting distinct fetor were always severe ones, and could not be controlled except by the radical operation. He would give a fairly favorable prognosis as regards the insurance risk when there was no distinct odor.

Dr. Ballenger referred to a boy of about eight years on whom he done a radical mastoid operation, and had occurred

six or seven years later from meningitis. It was one of his earliest operative cases, and it was possible that the operation had not been a complete one. He did not know positively that the meningitis was of otitic origin. While the presence of a fetid odor was not usually a favorable omen, he knew that the odor might be present in cases showing no dangerous element. Some years ago he had presented a paper on this subject, though not founded on such extensive statistics.

Dr. Snow expressed the opinion that when a competent otologist believed he had removed the cause of the ear disease the life insurance companies should be more lenient toward such applicants. He believed that in not a few very serious and obstinate cases, presenting no history of syphilitic taint, a good result was only obtained after the free administration of iodide of potassium. A case in point was narrated.

Dr. Phillips, in closing the discussion, thanked Dr. Ballenger for having reported a fatal case after mastoid operation and supposed cure. The existence of a fetid odor was important, because it indicated the presence of necrosis. This was an important subject, because it made it possible for certain applicants for life insurance to be accepted if they submitted to the radical operation.

Dr. W. C. Phillips thought the author was to be congratulated on calling attention to such a very important subject, which was of interest not only to the otologist but to those who also treated diseases of the nose and throat. One should not lose sight of the fact that any condition of the nose and nasopharynx accompanied by a constant flow into these cavities of infective material of any kind, rendered the ear peculiarly susceptible to a sudden invasion of the infectious process. This fact was well exemplified in the cases reported in this paper. A very common cause of acute mastoiditis was well known to be the grip infection, and this became seriously complicated in cases in which there was already an active or passive suppurative process going on in one of the accessory cavities.

Dr. Price Brown said that as most of these cases were connected with atrophic rhinitis or ozena the condition should

receive particular attention. These cases were so exceedingly chronic, and were so little improved by treatment, that a practitioner was prone to forget the necessity of keeping the parts clean. If the parts were kept clean, such serious results would be much less likely to happen; hence, the practical lesson to be learned from this paper was obvious, and should be impressed upon the minds of all.

Dr. C. F. Theisen said that this paper taught one very important lesson long ago brought out by Grünwald, i, e., that an atrophic rhinitis was always secondary to a sinus suppuration.

Dr. James E. Logan, of Kansas City, asked if any special examination had been made of the sphenoidal body in the cases reported in the paper. He agreed with the previous speakers that the papers had brought out a very important point, i, e., the involvement of the accessory sinuses in atrophic conditions. He felt satisfied that in the cases reported some involvement of the sphenoidal body was present. The pathology suggested by Fraenkel and others, i. e., that a pathological condition antedated a hypertrophy, was certainly not to be credited at the present day. Many suppurative conditions prone to involve the middle ear, could be found to be antedated by a suppurative condition in the accessory sinuses.

Dr. Goldstein said that the paper taught the absolute necessity of a very careful and minute examination of the nasal cavities and their accessory spaces for the association of a possible mastoid complication in these suppurative processes.

Dr. Hubbard, in closing, said that he had presented the subject in this light for the special reason emphasized in the the paper. Three of the cases might have been reported merely as mastoid cases, but he had taken another point of view to bring out the necessity for studying the accessory sinuses to determine the prognosis in cases requiring mastoid operations. The pathology of ozena did not seem to him of great importance in this connection. He would rather incline to the view that ozena was an atrophic disturbance. He regretted that the autopsies could not be made more exhaustive.

Further Observations of Tic Douleureux and Cranial Neuralgia from Intranasal and Sinus Pressure.

Dr. Sargent F. Snow, of Syracuse, presented this paper. He said that in the twenty cases he had observed and treated he had seen none which required excision of the nerve to obtain relief. Each one showed marked intracranial pressure or a collection in some of the accessory sinuses. The acute forms he had seen accompanied cold or sinus accumulations. The subacute form might present an equal degree of pain but did not clear up with the removal of nasal obstruction. A pain shooting outward and upward pointed to involvement of the anterior ethmoid, while a pain radiating around the lower jaw was commonly relieved by opening the sphenoid. The author was of the opinion that at least 80 per cent. of these cases were dependent upon intracranial pressure.

ABSTRACTS FROM CURRENT OTOLOGIC, RHINOLOGIC AND LARYNGOLOGIC LITERATURE.

I.— EAR.

The Relations of Auditory Rhythm to Nervous Discharge.

PROFESSOR MACDOUGALL contributes (*Psychological Review*, Vol. IX, No. 5; Sept., 1902) a discussion of the motor reactions which are aroused in the presence of a rhythmical series of sounds. Every presentation, he holds, tends to arouse some movement which, in kind, is imitative of the original. Consequently, unless some sort of inhibition supervenes, a succession of regular recurrent stimuli tends to set up a process of rhythmical movement, and, since stimuli which occur in periodic succession have a cumulative effect, there is a tendency for a form of movement of this kind, when once originated, to be perpetuated. Moreover, the kinesthetic sensation aroused by this imitative reaction is itself a presentation having the nature of an incitement to the repetition of the movement. This is the condition best observed in a simple nervous system, where in the absence of complications brought about by other simultaneously active processes, the origination of any movement tends toward the establishment of a rhythmical series of reactions. This process, obscured and disturbed by counter suggestions and the control of the higher centres in a highly developed nervous system, again becomes prominent in many pathological conditions. It appears in fever delirium in the meaningless repetition by the patient of a word or syllable which he has uttered or heard. It is also, Professor MacDougall believes, presented in the tetanic innervation of the muscular system characteristic of catalepsy and in the continued reproduction of a suggested movement by the hypnotic subject until the process is arrested by the hypnotiser. In more pronounced and obstinate forms it is manifested amongst idiots and the insane, where if it persists in an exaggerated type it is described as "echo-

lalia." These forms of activity are to be regarded as the expression of a primitive uncontrollable impulse to utterances, a reversion to a simpler type of activity, in which the elementary rhythms of motor innervation are uncomplicated by a rich'y-developed system of associated ideas. The fact that the rhythm activity represents a relatively undifferentiated type of reaction is also illustrated by the prevalence of the element of rhythm in primitive music and ceremonial. In its purest and most effective embodiment, as for example in rhythmic sequences of the drum tap, we have rhythm as the presentation of a purely sensory stimulus to the motor process, allowing the attention to centre in the reciprocal play within the sensori-motor arc, without the interference of a stream of changing ideas suggested by limiting stimuli from other sources. Dominant and effective rhythm can exist only in simple and musical and poetical compositions. In the higher forms of art the function of rhythm is essentially subordinate. It does not provoke any discernible type of motor response; losing its intrinsic significance for the esthetic subject in whose consciousness it appears, it serves chiefly as a secondary means of extending the scope of the attention process in its effort to grasp an ever wider set of pleasurable stimuli.

The Exercise of Common Sense in the Practice of Aural Surgery.

THEOBALD, Baltimore. (*Archives of Otology*, Vol. XXII, No. 2.) The author thinks that there is a tendency for the otologist to give the middle ear too much and the naso- pharynx too little treatment.

Constitutional treatment is very important and the specialist must not commit the common error of regarding all troubles as local.

He recently had observed a case where vertigo, nausea and tinnitus had been relieved by correcting an error of refraction. *Campbell.*

Affections of the Labyrinth Resulting from General and Organic Diseases.

POOLEY, New York. (*Archives of Otology*, Vol. XXXII, No. 2.) The author classifies as follows:

(a) Cerebral anemia and
Cerebral hyperemia which seldom cause serious ear changes.

(b) Hemorrhagic pachymeningitis and cerebro-spinal meningitis.
The latter the most common cause of deaf-mutism.

(c) Brain tumor.

(d) Parotitis. The occurrence of deafness from mumps, is next to that from scarlet fever.

(e) Syphilitic growths. The prognosis for hearing in acquired syphilis is better than in the hereditary form.

(f) Hysteria. *Campbell.*

Cerebellar Abscess.

EAGLETON, Newark, N. J. (*Archives of Otology*, Vol. XXXII, No. 2.) A boy aged 14, with an old right middle ear suppuration, began to suffer from earache which radiated over the head, vomiting and vertigo. He lost flesh rapidly, became dazed, and one day was found lying on his right side on the floor apparently dying; his right arm and left leg frequently twitched. Temperature 99.3° F. Pulse 62. Optic neuritis on both sides.

On operation half an ounce of pus escaped from the cerebellar tissue near the posterior surface of the petrosa. For one week there was marked improvement, then pressure symptoms increased, and on following up the original sinus, a large abscess cavity was found, running toward the median line, and from it two ounces of pus was evacuated. Recovery was tardy, and the patient's mentality is dull.

Campbell.

Intradural and Later Double Cerebral Abscess Complicating Chronic Tympanic Suppuration; Operations; Cure.

RANDALL AND POTTS. Philadelphia. (*Archives of Otology*, Vol. XXXII, No. 3.) A child aged 2, with a history of discharge from the left ear for 2 years. The discharge ceased; headache and vomiting set in. Tenderness and edema over the mastoid and bulging of posterior-superior canal wall. Temperature 102° F.

Operation was determined on and the child went into general

convulsions, more marked over the whole right side of the body. Temperature rose to 106.2° F, pulse 180. The mastoid was opened, granulations were removed, and pus found forming through the dura from the middle cerebral fossa. A restless night was followed by paralysis of the right arm and leg. Five days later temperature was normal, and motion returning in the arm.

On the tenth day the temperature again began to rise, pulse became slow, and in a few days vomiting and stupor supervened.

Exploration for brain abscess was deemed best, and through the operation wound without anesthesia a cerebral abscess containg 4 to 5 ounces of pus was evacuated. The cavity was cleansed by douching and cotton swabs and the wound packed with iodoform gauze. Three days later the pulse dropped again, the gauze was removed and fully 6 drachms of pus gushed from a second cavity lying above and posterior to the first one. Rubber drainage tube was now employed. Convalescence was uninterrupted.

Campbell.

Sarcoma of the Tympanum and Mastoid in a Child Aged Eighteen Months.

DENCH, New York. (*Archives of Otology*, Vol. XXXII, No. 2.) When first seen there were granulations in the auditory canal and paralysis of the sixth nerve. Opening the mastoid presented a cartilaginous, cauliflower-like mass invading the dura. This mass was removed and the patient subjected to x-ray treatment. Later the whole side of the head became very much swollen. The common carotid was tied to cut off nutrition, but the tumor is growing very rapidly and is invading the pharynx. *Campbell.*

After Treatment of Radical Operations Without Packing.

MUEHLEN, Riga. (*Archives of Otology*, Vol. XXXII, No. 2.) The retroauricular opening of the wound is always closed primarily. The first tampon of iodoform gauze remains, usually for six days. The second tampon introduced very loosely is left for two or three days. Eight days are quite sufficient to fix the flaps to their new layer, and then

packing is discontinued. The ear is irrigated with warm water each day. This removes any irritating secretions; the newly formed delicate epithelium is protected from maceration and is permitted to spread out.

In case of fetid discharge, irrigation is supplemented by a wash of 10 per cent. napthalian solution. Should granulatious be exuberant remove the excess with a sharp spoon.

If a tendency to a formation of stenosis is apparent, then we must resume packing, and especially where there is a tendeney for membranes to form between the middle ear and the mastoid cavity. *Campbell.*

Epithelioma of the Auditory Canal.

WILSON, New York. (*Archives of Otology*, Vol. XXXII, No. 2.) An epitheliomatous nodule was removed from the posterior auditory canal of a man aged 28. After being twice removed it again recurred and was subjected to x-ray treatment. From 50 to 60 applications were made without the slightest reaction on the part of the tympanum. The growth shrivelled up and disappeared. Hearing normal.
Campbell.

The Limits of Variation in the Depth of the Mastoid Antrum.

KERRISON, New York. (*Archives of Otology*, Vol. XXXII, No. 3.) The author made sections of 30 bones and drew the following conclusions :

1. That in operations upon the mastoid process the antrum should always be approached from the nearest point upon the mastoid cortex, which in the great majority of bones is the small triangular space just behind the supra meatal spine.

2. That this point is not only a guide to the site of the antrum, but also gives fairly accurate data as to the antrum's depth. The average depth of the antrum from the cortex was 11 mm. The average length of postero-superior mental wall was 14.7 mm.

3. That the depth of the antrum is always less than the length of the postero-superior wall of the meatus; that in the great majority of bones it is not over 12 mm., is often very less, and is never greater than 15 mm. or 5/8 inch.

4. That in exposure of the antrum a depth of 5/8 in. should be regarded as the extreme limit of safety.

Campbell.

A Study of the Pathology of the Internal Ear and the Auditory Nerve.

MANASSE, Strassburg. (*Archives of Otology*, Vol, XXXII. No. 2.) Case 1. Multiple disseminated grey degeneration of the auditory nerves.

A man aged 43 had succumbed to pulmonary tuberculosis. During his illness he suddenly lost his hearing and examination during life failed to reveal pathological lesions.

By gross and microscopical examination no lesion could be found in the middle or internal ear until sections of the auditory nerves stained with hematoxylin and eosin revealed a large number of pale areas, between the fibres and the nerve trunks. These areas consisted in greater part of fibres of various thickness arranged in an exceedingly delicate network and small sphenoidal lamellated bodies easily recognizable as corpora amylacea. By Van Giesen's and Weigert's stains the absence of nerve structures in these disseminated areas was conclusively proven.

Case 2. Disease of the labyrinths and the auditory nerves in a syphilitic subject.

A syphilitic, aged 35, died suddenly as a result of rupture of an aneurism of the basilar artery.

Fine granular deposits were found covering the epithelium of the roof of the scala vestibuli and the under surface of the lamina spiralis ossea and the basilar membrane in the scala tympani. The most marked and peculiar changes had taken place in the scala tympani, close to the modiolus. The new formation was made up of fibres arranged in a coarse network containing stellate connective tissue corpuscles at their intersections. The cells of Corti's organ were swollen, some containing beads of hyaline material. The vestibule and semicircular canals contained numerous small hyaline highly refractive bodies in the space occupied by the perilymph.

Where the auditory nerve entered the labyrinth its fibres were separated by an interposition of round cells and blood corpuscles. At the porus acousticus internus the nerve was so distended that it completely filled the canal.

The pathological condition of both sides practically the same. On both was the sound-conducting apparatus normal.

Campbell.

The Treatment of Complications of Chronic Middle-Ear Suppuration.

McKERNON, New York. (*Archives of Otology*, Vol. XXXII, No. 3.) In all cases attention must be directed to the nose and naso-pharynx.

In acute mastoiditis if the case is of several days duration avoid the use of cold or heat, and make a bacteriological examination of the pus discharge; in all operations open the mastoid tip.

To render the dressing painless insert a sterile, perforated piece of rubber tissue into the bone cavity, and then pack in the gauze.

In all periosteal abscess cases, open the mastoid. In sinus thrombosis open the sinus with the scalpel, exposing the lower end of the sinus as near the bulb as possible. If the sinus contains a disintegrated clot or pus, resect the jugular vein ligating it at the clavicle and resecting it up to the bulb.

In brain abscess use scalpel and finger for exploration; be on the look-out for multiple abscesses, irrigate with warm salt solution and establish drainage. *Campbell.*

Are there Variations in the Course of the Facial Nerve Having Bearing Upon the Mastoid Operation?

RANDALL, Philadelphia, (*Archives of Otology*, Vol. XXXII, No. 2.) The author examined 100 skulls, inserting straight probes into the stylo-mastoid foramina, and noted any deviation of the probes from the perpendicular.

In the sagittal plan deviations from the exact perpendicular were absent, while in the transverse plan 58 showed no recognizable departure from his positions. In no case was the deviation more than 10 degrees and in but 30 was it more than 1 or 2 degrees, and in 27 of these the direction was inward toward the vertebral column and not outward as generally claimed. In only 3 cases was the outward tendency notable and in these it varied from 5 to 10 degrees.

The distance of the facial canal posterior to the back wall

of the meatus was found never less than 2 mm. nor more than 4 mm.

The descending facial nerve crosses the oblique plane of the Mt. 3 mm. back of the middle of the posterior margin of the annulus. Therefore in removing the posterior meatal wall one should aim to cut below the tympano-mastoid suture in order to keep in safe territory. *Campbell.*

A Discussion on the Differential Diagnosis and the Treatment of Osteo-Sclerosis of the Mastoid Process.

STEIN, Chicago. (*Archives of Otology*, Vol. XXXII. No. 3.) The author gives a historical resume of this condition, then differentiates it from :

(a) Otalgia associated with inflammatory conditions of the middle and internal ear.
(b) Hysteria and allied conditions.
(c) Neuralgia from other than ear troubles.

Having made the diagnosis one's object is to relieve bone tension, remove as large a core of bone as possible, leaving the edges and surface of the cavity clean and smooth.

Campbell.

Subperichondrial Abscess.

KNAPP, H., New York. (*Archives of Otology*, Vol. XXXII, No. 3.) A child aged 5 had suffered for a month from otitis media suppurativa acuta. When first seen the cartilaginous walls of the concha, including the crus and spine of the helix, were swollen and bluish, under the spine fluctuating. The calibre of the ear canal was narrowed, containing thin pus.

The posterior wall of the cavum conchae and the lower spine of the helix were incised, allowing thick pus to escape, thus differing from the thin, flocculent liquid seen in chronic perichondritis.

Probing discovered an abscess cavity extending inward to the osseous auditory canal. So the posterior-inferio meatal wall was split its whole length. The cartilaginous wall was scraped, carefully dried and packed with sterilized gauze. There was no further pain or discharge, the dressing was left in place for one week, then removed. The auricle

was healthy and in good shape, the canal dry and normal, the hearing good with Mt. slightly opaque. *Campbell.*

A Brief Report of Forty Radical Operations for Chronic Purulent Otitis and Complications.

KNAPP AND JORDAN, New York. (*Archives of Otology*, Vol. XXXII, No. 2.) This series of cases embraces the greater number of pathological conditions which demand radical operation.

The method of operating was according to Zaufal, Kuster or Stacke, and in making the plastic flap care was taken to dissect out the cartilage in the conchal part.

In six cases labyrinth fistulae were found, and in four there were intracranial complications. *Campbell.*

Three Cases of Encephalitis in Connection with Otitis Media.

Voss, Riga. (*Archives of Otology*, Vol. XXXII, No. 3.) These cases developed acutely with general cerebral symptoms, and in two of them focal symptoms of motor aphasia. In all there was sudden rise of temperature, drowsiness and slowing of the pulse. In the one case which came to autopsy the dura was found adherent to the pia in many places. Considerable edema of the pia over the parietal lobes, and on the lower surface of the right temporal lobe a yellow softened spot in the cortex. *Campbell.*

Abscess Sac at the Site of the Saccus Endolymphaticus.

HORNE. (*Brit. Med. Jour.*, July 12, 1902.) Specimen exhibited at the Otological Soc. of Great Britain.

Case of Chronic Suppuration of Middle Ear. Cerebellar Abscess.

ROUGHTON, (*Lancet*, July 15, 1902.) When under chloroform breathing ceased, under artificial respiration trephining was performed, and a left cerebellar abscess was opened, after failure to find pus on the right side. Spontaneous respiration recommenced at once on evacuation of pus, but death occurred six hours after operation. There was no carries or necrosis of temporal bones. Mesenteric glands enlarged.

(There is no reference to examination of the pus for tubercle bacilli. Still it was doubtless tuberculous.—Abst.)

Occlusion of the Lateral Sinus and Internal Jugular Vein an Essential Part of the Method Employed by Nature, and by the Surgeon in Imitation of Nature, for Arrest of Acute General Infection Having Its Origin Within the Temporal Bone.

CHARLES A. BALLANCE, M.S. Lond., F.R.C.S., Eng. (*London Lancet*, Sept. 20, 1902. Abstract by Dr. Wyatt Wingrave.) In this paper I propose to discuss, not details of cases, but fundamental principles, and it therefore appears to me to be of the first importance to survey the position from the widest standpoint of surgical knowledge and practice.

Septicemia and pyemia, which arise from infection of parts of the body other than the temporal bone, may present various clinical varieties, (1) a fulminating general process without active inflammation at the seat of inoculation, as in acute septicemia resulting from a puncture made at a post-mortem examination without the occurrence of abscess in a finger which was pricked; (2) a fulminating general process with signs of inflammation at the seat of inoculation; (3) cellulitis rapidly spreading from the site of local inoculation with signs of violent general infection, as in acute traumatic gangrene; (4) acute local suppuration in bone with septic thrombosis of the venules, the infection being carried from these into the general circulation, as in acute osteomyelitis; and (5) infection from without of a local chronic suppuration, the pus putrefying and causing subsequent general infection, as in the case of necrosis after amputation so commonly seen before the antiseptic era.

SOME REMARKS ON VENOUS INFECTION.

When the general infection is very acute it seem that the circulation must be primarily involved in the infection.* A

*See Muir and Ritchie's Manual of Bacteriology, page 153, and "An Experimental Investigation of Pyemia," by Gaertner, American Journal of the Medical Sciences, March, 1902. The author produced pyemia by introducing artificial thrombi, formed of infected pieces of cotton wick covered with gum arabic, into the jugular vein.

clear statement of this important pathological fact was made by the ghost of a fatal case of aural septicemia:—

> **"And in the porches of mine ears did pour**
> **The leprous distillment; whose effect**
> **Holds such an enmity with blood of man**
> **That swift as quicksilver it courses through**
> **The natural gates and alleys of the body.**
> **And with a sudden vigor it doth possess**
> **And curd----**
> **The thin and wholesome blood."***

Why is general infection uncommon from a finger prick? Because the infective particles do not find a ready way into the general circulation but are dealt with by the cellular tissue. In slight wounds capillaries rather than venules are punctured. Moreover, the superficial veins of the limbs run a long course before joining the large deep veins, and their valves are sites at which septic matter is not seldom arrested. Why is general infection so common a result of septic infection of the uterus after child-birth? Because there is a ready way into veins of large calibre, with but little protective cellular tissue intervening. An illustration of the disastrous effects of sudden access of septic material to the general circulation is afforded by the violent septicemia which occasionally follows operations involving the opening up of old and septic sinuses. Again, unless the local anatomical conditions are specially favorable to the infection gaining the interior of a large vein, infected blood from a local infective area is largely diluted with pure blood before reaching the heart. Even with large collections of pus, as in empyema, unless the pus becomes putrid a considerable time usually elapses before the patient is seriously threatened with general infection. Varying virulence of the infection can only be judged of by its effects. Independently of the nature of the micro-organism the manner of inoculation may influence the result. "Sinus-phlebitis is most frequent in streptococcus otitis. All infective agents which may give rise to otitis may on occasion cause a pyemia spreading

*Hamlet, Act I, Scene 5.

therefrom, but are only exceptionally observed in proportion to streptococci."*

The distinction of septic infection from septic intoxication is not often required; it is important, however, to bear it in mind. A few years ago I published a case of lateral sinus sapremia which bears this out.† Brieger refers to cases of toxemia and goes on to say: "Eulenstein saw such a case of acute pyemia in which metastases were absent, caused by mural sinus thrombosis; continued fever of several days' duration was alone present with sudden death in collapse, apparently a pure toxic effect."‡

Free circulation of the infective agents in the blood-stream is the essential condition of general infection. This may be a primary result of the initial inoculation or may occur secondarily after local effects have been produced. The explanation of these differences is not clear. A quite similar phenomenon occurs in certain of the acute specific fevers.

In acute general infection coagulation of the blood in a large venous channel is not a common occurrence. It is indeed accidental in the sense that its occurrence depends, as a rule, on the spread of inflammation from the primary source of infection to the wall of the great venous channel. In acute suppuration surrounding a large vein the vein is seldom affected, tension of pus and direct entry of small veins into the large vessels being absent, and the lymphatic sheath barring the infection of the venous wall. For example, the internal jugular vein does not usually become thrombosed as a result of angina Ludovici. The conditions are the exact opposite in suppuration surrounding the lateral sinus; the pus is under great tension, there is abundant opportunity for small infection, and there is no lymphatic sheath. In osseous tissue generally direct venous infection is more likely to occur than in soft tissue, but nowhere do veins from bone enter a large venous channel after a shorter course than in the temporal bone, and this, I think, constitutes a special source of danger.

*Brieger; Verhandlungen der Deutschen Otologischen Gesellschaft auf der Zehnten Versammlung in Breslau, 1901, p. 67.

†Allbutt's System of Medicine, article "On Certain Affections of the Ear," Vol. VII, p. 604.

‡Brieger, loc. cit., p. 76.

From much that has been written on the subject it might be thought that thrombosis of the lateral sinus or jugular vein is a necessary step in the development of septicemia or pyemia from temporal bone disease. This is not so; the occurrence of thrombosis is here an accidental phenomenon due to the peculiar anatomical relation of the lateral sinus and the jugular bulb to the temporal bone, which has no exact counterpart in the rest of the body. The lateral sinus being situated in a groove in the bone itself, in close proximity to, and in intimate connection with, the diseased area, becomes involved in the local septic process and thrombosis results. The sinus thrombosis is really a *protective measure* and when the clot remains uninfected it is successful.* The thrombus, however, may become infected and the disease will then

"**Break out into a second course of mischief.**"†

Thus is set up an additional source of danger often of such gravity that it overshadows the primary disease.

Thrombosis occurring in a great venous channel like the sinus, does not lead to its sudden occlusion. The clot which first forms in the vessel as a result of an alteration in its lining membrane lies along the wall of the vessel but does not occlude its lumen. By the addition of successive layers the clot may extend so as completely to arrest the stream of blood through the vessel. Blocking of the channel may, however, not occur in consequence of the cessation of the clotting process, or the block may fail to be permanent by reason of the construction of the clot. From the close proximity to, and intimate connection of the vessel with, the infective area in the bone infection of the clot occurs, so that there comes to be an additional local centre of infection continuous with the primary one, from which not only microorganisms but gross particles of infective clot may be carried into the circulating blood. Then there is present that most dangerous condition—an infective thrombosis with but a partially obstructed blood current. It is here that the surgeon may happily complete what nature has failed to carry

*See some remarks by Jansen, Verhandlungen der Deutschen Otologischen Gesellschaft.

†Henry V, Act IV, Scene 3.

through. In the rare cases in which septicemia or pyemia occurs from temporal bone disease without obvious infection or destruction of the sinus or vein the infection has been so virulent that no local protective thrombosis has ever been attempted. It is the secondary infection of the clot and *not the occurrence of thrombosis* that constitutes the danger.

Brieger appreciates the fact that thrombosis is an epiphenomenon. He says: "Such metastases without the intermediary of venous thrombosis occur in mucous membrane affections analogous to middle ear suppurations. Such are the secondary manifestations of gonorrhea which may be described as gonococcus pyemia. The occurrence of this form of pyemia without sinus thrombosis by means of purely bacterial emboli rendered probable by clinical observation is becoming unequivocally demonstrated by anatomical observations. It is especially in pneumococcus otitis that general infection of this nature occurs."* On rare occasions the blood may so teem with microbes that when clotting occurs in the sinus the thrombus may from the first be infected.

When thrombosis takes place in a large vein from the milder septic infections of the cervix uteri, though the local effects of the blocking of the venous channel are troublesome enough, there is not commonly breaking down of the clot and pyemia, because the conditions leading to the secondary infection or clot are for the most part wanting.

Jansen† explains some rare forms of rapidly fatal general septic infection by referring the path of infection to the lymphatics. If this were so, it would really be *venous infection* at *another point*, but the narrow calibre of the lymphatics and the intervention of glands along their course render it difficult to understand how general acute infection can occur by way of the lymphatic system without intermediate local effects. In these cases a local gangrenous process of bone and soft parts sets in,‡ putrid pus exudes, and the surface presents a greenish-grey appearance. "The examination of the

*Brieger, loc. cit. pp. 39–41.

†Encyklopädie der Ohrenheikunde. von Louis Blau, Article, Septicämie Otitischen Urspgunges, p. 363.

‡See description of case by Ballance, Transactions of the Otological Society, vol. ii., p. 37.

bulb of the jugular has not always been made with such care as is needed to detect small circumscribed diseased spots in parts of the vessel wall which are only with difficulty accessible. In the case of acute sepsis which I have observed I have found," says Jansen, "thrombo-phlebitis of the jugular in which the septic thrombus was not shut off by firm uninfected thrombus. In this particular form of septic illness such (thrombotic) processes, or only mural thrombi, alone come in question and not the common form of occlusive thrombo-phlebitis. The observations found in literature are not all beyond doubt. Whether, or how, the bulb of the jugular was examined is mostly not apparent. So there still drags the decision of the question as to how far this particular clinical type of disease really occurs without the intermediary of involvement of the sinus or jugular vein."* "By the pressure of an extradural abscess the sinus may be obstructed and the development of a thrombus brought about in a purely mechanical manner (as by an aseptic ligature which causes coagulation by inducing a proliferation of the endothelium) without any infection and without the possibility of a secondary pyemia .The outer wall of the sinus is thin,being only the thin outer layer of the dura. The septic infective process much more readily spreads through this thin wall and reacts upon the endothelium and sinus contents than through the whole thickness of the dura. The immediate effect of an extra-dural abscess is for the most part confined to the outer layer of the dura, the sinus is thrombosed, but the brain is found still covered by the intact inner layer of the dura. The thrombosis which is caused by compression of the sinus in a purely mechanical manner may, when the focus of infection has been removed, remain uninfected. To attack such a thrombus by operation would be an error. Even contact with the needle used for paracentesis (a futile procedure in any circumstances) might infect it. The earlier pyemia arises in acute ear infections the more probable is it that the point of departure of the general infective process is to be sought in the bulb."†

*Jansen, loc. sit.

†Jansen: Verhandlungen der Deutschen Otologischen Gesellschaft, 1901, p. 14.

The small mural thrombi alleged so often to have been overlooked in the bulb are not necessarily the cause of the pyemia. They may in some cases represent an *abortive attempt at protective occlusion*. Too much stress has been laid on the lateral sinus and the jugular bulb as the sole seat of infective thrombosis. I have had a case of pyemia due to superior petrosal sinus infective thrombosis, without thrombosis of the lateral sinus. This point is touched upon in certain of the text-books* and by Jansen.† Brieger‡ says: "Primary thrombi arise in the superior petrosal sinus, especially from suppuration in the labyrinth, and are also observed in acute suppuration in the tympanum in scarlet fever." The size of the lateral sinus concentrates the mind too exclusively upon it, while in pyemia resulting from disease in other regions of the body, no large vein being in near proximity to the disease, the attention is not distracted from the numerous small veins, each one of which may harbor an ineffective thrombus which may equally produce the disease.

The process of disease in the temporal bone and in the tissues around it is one *continuous* infective process. It is a mistake to think of the infection of the osseous, dural, and blood tissues as separate pathological entities. The differences are anatomatic and physiologic, not pathological. As the spread of the infection is by continuity of tissue the infection of the dura, for obvious anatomic reasons, precedes that of the blood. The march of the infection will thus be in this order: perisinusitis, sinusitis, blood infection. Infection of the blood suddenly brings into being a new factor, for it is infection of a tissue the liquid texture of which confers upon

*See Barr, Diseases of Ear, third edition, pp. 286, 365 and 366 Politzer: Lehrbuch der Ohrenheilkunde, fourth edition p. 495. "Less common paths of infection are the inflammations which spread along the internal auditory vein or the veins of the aqueduct to the sinus petrosus *inferior*;" and again: The sinus transversus passing along the inner side of the mastoid process is most frequently attacked by the purulent inflammation; more rarely the sinus petrosus superior and inferior, the cavernous sinus and the jugular bulb.

†Jansen, loc. cit. p. 14.

‡Brieger, loc. cit. p. 65.

it the physiologic property of constantly traveling through all the tissues of the body.

Some Surgical and Pathological Remarks.

Nature's process for the prevention of general infection is sequestration of the infective material, as is shown by the formation of local abscess. Thus nature surrounds the poisoned tissues, be they in bone, in dura, or in blood (by coagulation), with an inflammatory barrier; and the surgeon, as the plan of nature for the saving of life is unfolded before his vision, learns the lesson of how, and by what means, surgical art may successfully deal with acute septicemia and acute pyemia. These cases have one thing in common—they are always acute. The only subdivisions we can recognize have to do with their early history and are as follows: (1) those in which the acute illness follows on and developes from a chronic suppuration, and (2) those in which the acute illness is but a further stage of a recent acute suppuration. But these differences in origin do not justify the notion that the surgical treatment suitable in the one case is not equally right and proper for the other. I contend that the principles of surgery apply in either case without modification, detraction, or alteration. Koerner* quotes from Schwartze that "more than half of the cases of otitic pyemia get well without ligature of the jugular, by simply opening the antrum with or without clearing out the broken-down thrombus in the sinus;" and he adds as a comment: "Here cases of pyemia with and without sinus-phlebitis are confused together." I cannot but think that there is also confusion in Schwartze's statement between the cases with pyemia and the cases which, though acutely ill, had only a local affection. Just as a patient has pus pent up beneath the palmar fascia, though he may be acutely ill, is not necessarily suffering from septicemia or pyemia, so it is true that a patient with temporal bone suppuration, though acutely ill, may also be the victim of a *local rather than a general process.* This is a point upon which the surgeon's mind should be clear before he proceeds to operate. In the temporal bone there may be

*Die Otitischen Erkrankungen des Hirns, second edition p. 79.

acute or chronic suppuration spreading from the tympanum and mastoid to the lateral sulcus without obvious thrombosis or severe inflammation of the lateral sinus and jugular vein. In such a case operation on the sinus or vein is not necessary unless there is evidence of general infection. "When a periphlebitis has been exposed we are justified in stopping the operation and awaiting the result, if the patient is not already suffering from a severe pyemia." *

Even if suppuration has involved the dura mater and coagulated the blood in the sinus the opening of the local abscess in the groove or in the sinus may cure the case—i. e., if nature has provided against general infection by occlusion of the sinus. Brieger says: "Even a thin layer of a sound clot may be an efficient barrier against embolic detachment of particles. If the apparently healthy terminal portions of clot are allowed to remain suppuration may, however, occasionally arise therefrom. As I have demonstrated, not every apparently sound portion of terminal clot is poor in bacteria. The subsequent breaking down of these terminal portions has, however, scarcely any danger provided that there is such a free opening as to ensure the ready escape of the products of suppuration." (The danger is diminished if there is a free opening, but is it true that it scarcely exists? Do we in these cases obtain an opening which is surgically free? The danger would surely be much less if the jugular were tied.) "Certainly, if we restrict ourselves to the removal of the pus or the breaking down clot we may overlook a sp eading 'disconnected' thrombus on the far side of the sound portion. Against this the mos complete clearing-out of the sinus will not protect us."†

The sinus and vein constitute the main route by which the infective agents travel, whether thrombosis has occurred or not. If nature has placed an effectual block in the shape of an uninfected thrombus on the cardiac side of the infective focus the surgeon has been anticipated in the most efficient and effectual manner. But as Viereck‡ remarks: "Surely

*Jansen, loc. cit., p. 28.

†Brieger, loc. cit., p. 97.

‡Verhandlungen der Deutschen Otologischen Gesellschaft auf der neunten Versammlung in Heidelberg, 1900.

we should not rest content with the always doubtful evidence of occlusion which an apparently sound thrombus affords if we considered ligature (of the jugular) as entirely free from danger." It cannot, then, be true that in a given case there are indications and contra-indications for operation on the vein.

The question is as to the *exact diagnosis*, not as to the right method of treatment, for in a particular morbid condition there are not two right plans of treatment but one right plan of treatment.

There may be doubt as to the exact pathological condition present and then vacillation as to the course to be pursued may arise. From the experience, often dearly enough bought, of many workers, certain valuable guiding principles of treatment can be with some precision formulated and much of the knowledge which has been gathered can be imparted.

Although the danger of infection by way of the blood stream cannot be said to be averted completely unless all the blood from the infected area is arrested (and as ligation of all the veins and lymphatics is impossible this condition cannot be realized by any measure short of complete excision of the whole diseased area, which is, indeed, also impracticable), yet, as the internal jugular vein in the direct highway along which in these cases highly infected blood is reaching the heart by a short route and with little further admixture with pure blood from uninfected regions, the establishment of a block in the highway must prevent direct access of infective material and so greatly reduce the risk from the primary source.

Experience has shown the great efficacy of the operation on the vein, even though the whole of the local disease may not have been removed, as in Case 4 of my first paper.* It is, therefore, idle to maintain that the collateral circulation through occipital and petrosal sinuses and the condylar and vertebral veins renders abortive the surgical occlusion of the main sinus and vein. These latter represent the wide gate and broad highway that lead to destruction, and when

*Ballance: On the removal of Pyemic Thrombi from the Lateral Sinus, Transactions of the Medical Society of London, Vol. xiii.

these are obstructed if the poison finds a new pathway to the general circulation it encounters a narrow gate and circuitous route which retard its progress and tend to dilute its virulence.

Brieger, in a statement qualifying his recommendations for ligature, says: "It is questionable whether ligature is needed for the obliteration of the jugular or whether its obliteration may not be spontaneously brought about just as surely as by ligature through certain processes following sinus thrombosis.* It might be just as truly maintained, I think, that operation should be discarded in a case of empyema, since a a collection of pus in the chest may be limited by adhesions and discharge spontaneously.

It has sometimes been objected that the operation on the vein is a dangerous procedure and all sorts of bogies, such as edema of the brain and the entrance of air, have been conjured up to throw light upon the wisdom and advisability of the procedure. In general surgery the jugular vein is constantly removed in order to facilitate the ablation of glandular and other tumors of the neck, and in my view the operation presents, in skilled hands, no danger and "the loss of the vein does not make the slightest difference to the patient."† It must be remembered that in most of these cases the operation recommended does not block a still patent venous channel but one which is already packed with septic clot and more or less impermeable. "The only objection that could be urged against the doctrine of dealing with an apparently uninfected clot in the radical way suggested is that cases not due to ear disease are known in which recovery has taken place after non-septic thrombosis of the lateral sinus, and that in these cases canalisation of the clot may occur, so as to allow of the passage of blood again along the once-plugged sinus. The objection does not appear to me to have any weight, and the risk of leaving untreated a clot in the immediate neighborhood of very virulent septic matter in the hope that it may remain uninfected seems so great that it puts out of court what is at best only an imaginary advantage—viz.:

*Brieger: Loc. cit., pp. 102, 103.

†W. Watson Cheyne: Harveian Lectures, p. 37.

the chance of the sinus becoming patent again and thus functionally useful to the patient *

STATISTICS AND OBSERVATIONS OF SOME SURGEONS.

The appeal to statistics does not have so great weight with me as the matured judgment on the matter in dispute of an experienced surgeon. This is in part due to the fact that probably in most of the worst cases the jugular is tied, and secondly because in the majority of cases in literature there is no such account as will satisfy a critical examination or will justify a critical personal judgement as to the (*a*) virulence of the disease, (*b*) the local conditions found at the operation, and (*c*) the appropriateness of the measures employed by the surgeon. Nevertheless, some figures given by Viereck† are sufficiently instructive to quote. In 94 cases of uncomplicated thrombosis of the sinus the jugular vein was tied in 40; six died from pyemia and 34 recovered (85 per cent.); and of these recoveries 28 (70 per cent.) were without complications and six (30 per cent.) were complicated with fever and metastases. Of the 54 cases in which the jugular was not tied 13 died from pyemia and 41 (76 per cent.) recovered, and of these recoveries 14 only (46 per cent.) were without complications and 27 (54 per cent.) were complicated with fever and metastases. It therefore appears that ligature prevents metastases. Viereck sums up: "In ligature (of the jugular) we posses a method which prevents pyemic infection more surely than does operation on the sinus alone, with which, therefore, it should always be combined. In order to avoid the danger of detachment of fragments of clot and of entrance of air into the vein the operation on the vein should precede that on the sinus."

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*Ballance, loc. cit.

†Viereck, loc. cit. The account of the cases quoted is even more instructive than figures from the point of view of operation on the jugular.

VIERECK'S TABLE.

94 Cases of Uncomplicated Thrombosis of the Sinus.

—	40 with ligation.	54 without ligation.
Died from pyemia.....	6–i.e. 15 p. cent.	13–i.e., 24 per cent.
Cured.....	34–i.e. 85 " "	41–i.e., 76 " "
Cured without complications.....	28–i.e. 70 " "	14–i.e., 46 " "
Recovered with fever and metastases.....	6–i.e. 30 " "	27–i.e., 54 " "

14 Cases of Thrombosis of the Sinus and of the Internal Jugular Vein.

—	12 with ligation.	2 without ligation
Cured without complications.....	12	0
With metastases.....	0	2

Brieger* says: "In the cases of pyemia in which, on account of the negative result exploration of the sinus, I have believed that mural thrombi were present, I have seen recovery occur without ligature of the jugular, although at least one of the cases was charactized by special severity, particularly on account of the number and character of the metastases." Ligation, it would appear, is most important when the sinus is not completely obstructed by clot.

At the meeting of the German Otological Congress in Breslau in 1901 Jansen, for whose judgment and operative skill I have the highest regard, read a very important paper. He stated that pyemia there was always a diseased sinus; in four only out of his 63 cases had he failed to prove the presence of sinus-thrombosis.† He recommends l gature of the jugular:—1. As the first step of the operation (*a*) in undoubted cases of jugular phlebitis and (*b*) in severe sepsis. 2. After exposure of the sinus (*a*) if the sinus appears sound and there

*Brieger, loc. cit. p. 100.

†Jansen, loc. cit.. p. 35, 36.

is no perisinous affection, but rigors and marked oscillations of temperature are present, and (*b*) in periphlebitis and mural thrombosis under the same conditions. The sinus should be opened (*a*) on the evidence of the presence of septic broken-down thrombus, when the result of puncture is negative; (*b*) in gangrene of the sinus wall; (*c*) in repeated rigors, marked oscillations of temperature, and poor general health; and (*d*) when optic neuritis is present, in most cases if not always. 3. After incision of the sinus (*a*) if septic thrombus is, or was, situated in the immediate neighborhood of the bulb, and (*b*) if after the incision of the sinus the rigors do not cease or the temperature materially decrease or should other cerebral symptoms persist. Jansen's table of 50 cases is as follows. Of 30 cases without ligation 22, or 73 per cent., of the patients recovered, and of 20 cases with ligation 13, or 65 per cent., of the patients recovered. Notwithstanding Jansen's numerous successful cases which recovered without operation on the vein, yet his recommendations for operations on the jugular are so comprehensive that one can scarcely imagine a case of pyemia which would not come within their scope.

Macewen* says: "Where the infective thrombus in the sigmoid sinus has undergone such extensive disintegration as is unlikely to be reached by obliteration of the upper two-thirds of the sigmoid sinus the ligature of the internal jugular is indicated. When in a thrombosed internal jugular giving the sensation of a hard cord-like structure its upper part becomes soft rom disintegration of the thrombus, and when this is followed by descending disintegration, ligation of the vessel below this point is in most cases necessary. When one can foresee in the outset of the case that the vein requires to be ligatured it had better be done as the first step before clearing out the sigmoid sinus, as greater freedom may then be obtained while performing the latter. In the majority of instances the obliteration of the upper two-thirds of the sigmoid sinus is all that is necessary for the prevention of systemic infection."

Brieger† gives the following figures: "Out of the total of

*Pyogenic Infection of the Brain and the Spinal Cord, pp. 310, 311.
†Brieger, loc. cit., p. 101.

38 cases which I have observed 26 were operated on; in 10 the jugular was tied with five recoveries and in 16 it was not tied with eight recoveries, so that the percentage was the same in both series. A critical examination of the individual cases does not materially alter the result—is, perhaps, a little more unfavorable to ligature." The important thing must be, not whether a certain number of patients recover without operation on the vein, but whether a certain number of patients die who would have recovered had the operation on the vein been done. Brieger's recommendations respecting the operation are as follows: "In my judgment the vein is to be exposed as a preliminary measure only in those cases where the diagnosis of primary bulbar thrombosis is possible with special precision; but after the exposure of the sinus the vein should be exposed in the following cases: (1) straightway in immediate combination with the sinus operation only when the infective process cannot be completely commanded by the operation on the sinus, or does not appear to be, by this means, made completely accessible, that is to say—(*a*) if the cardiac end of the breaking down process cannot be reached through the open sinus; (*b*) if when the sinus is found normal there exist such local conditions as point, with some degree of certainty, to the presence of jugular thrombosis. Further experience must show whether we are justified in endeavoring to determine the permeability of the jugular by Whiting's method and by compression of the jugular in the neck, and how far the measures to be adopted should depend on the result of this investigation." (This method of investigation must be highly dangerous if there is any clot in the vessel.) "2. During the subsequent course of the case (*a*) if fairly positive signs of the extension of the sinus-thrombosis into the vein should arise; (*b*) if with a normal sinus, after the evacuation of perisinous abscesses or other foci from which mural thrombi may develop, typical fever and the occurence of metastases persist. In all these cases the exposure is first the important thing; ligature can be combined with it if the nature of the contents of the vein allows of the immediate slitting up of the exposed portion. Here, again, also, after the exposure of the vessel ligature is to be made depenent

upon local indications arising from the inspection of the exposed vein, from the alteration of its degree of distension by compression and from the examination of its contents by exploratory puncture. I sum up: 1. Sinus phlebitis is always to be treated by operation. The presence even of severe complications or advanced metastases—meningitis, pulmonary abscess with pyopneumothorax—does not exclude the possibility of recovery. 2. The operative treatment must always begin at the primary source of infection. The clearing out of this may suffice to bring about the resolution of a pyemia caused by mural thrombi, and it is in every case indispensable in order to obtain permanent recovery. 3. In the presence of unequivocal symptoms of primary thrombosis of the jugular bulb operation is best done on the jugular and not on the sinus. 4. Ligature of the jugular cannot entirely prevent the occurrence of metastases and is often unsuccessful when carried out as a purely prophylactic measure. 5. It should therefore only be employed upon particular indications."* It is worth remark that this summary begins: "Sinus phlebitis is always"—it is not the sinus-phlebitis which requires operation, on the vein at all events, but the pyemia.

Preysing,† in relation to the question of ligature of the jugular, divides the principal forms of sinus-phlebitis into three groups (here, again, sinus-phlebitis, not sinus-pyemia): "1. Sinus thrombosis without symptoms—(*a*) quite fresh clot in the sigmoid sinus or (*b*) old occluding thrombi consisting of firm granulation tissue such as are commonly first discovered in the course of a temporal bone operation. In both cases ligature should remain undone unless subsequent complications should arise. 2. Cases characterized by clear and definite signs of participation of the jugular in the infection or definite pyemia with metastases. Here ligature should always be done and that before the temporal bone operation. 3. Thrombi in the sinus softened in the centre but firmly shut off on both sides. In these cases ligature should be done if rigors, fever, etc., persist or arise after the

*Brieger, loc. cit., pp. 108–111.

†Verhandlungen der Deutschen Otologischen Gesellshaft, 1901, p. 118.

temporal bone operation has been carried out, but we can wait with a clear conscience when these threatening indications are absent. If ligature must be done in this third group of cases it will naturally follow the mastoid operation; the right may, however, be conceded to every operator, if he believes he has diagnosed this third form of sinus-thrombosis, to carry out the ligature before the trephining." This is in practical agreement when the significance of the last sentence is considered, with the advice I gave when first I wrote on this subject, that operation on the vein should be done when the pyemia is present or is threatened. The cases in Preysing's first group are obviously not pyemia.

In the paper written in 1889,[31] I said: "The diagnosis having been made there remains for discussion the question of treatment. This must *in all cases* be two-fold—viz., the free exposure and removal of the focus from which pyemic infection has occurred *or is threatened;* and secondly the establishment of a block in the highway along which the infecting agents are traveling from the local focus into the general circulation. . . . . With regard to the vein . . . . it should certainly be ligatured *in all cases* of thrombosis of the sinus associated with ear disease and though it may not be possible to determine whether a given thrombus be septic or not septic, yet the probabilities are so great that if the thrombus be not already infected it will become so, that it would be fool-hardy in such a case not to ligature the vein . . . . ." In the same paper I dealt with the question of pyemia arising from the temporal bone without obvious infection of the lateral sinus and I wrote: "Under such circumstances it behoves us to inquire whether surgical interference offers any hope of life to the patient. The answer to this question is, for me at least, an emphatic affirmative. Whether the sinus be full of clot or moving blood it matters not; in either case the poison is being poured into the sinus, or say, through the vein of the cochlea into the jugular; and the method which has proven efficacious in saving life in the one case will assuredly, if promptly applied, be equally successful in

[31] Ballance, loc. cit.

the other. The local disease of mastoid or petrous must be freely exposed and antisepticised with sublimate solution. The vein must be ligatured in the neck and the sinus must be freely exposed in the usual way behind the ear, opened and plugged. Thus an artificial thrombosis of the blood arrested between the plugged sinus and the ligature on the vein will be effected. It will then not be possible for any further infection to happen from the primary source of disease, for the collateral circulation is not sufficient to carry the infective material down the other jugular, as is shown by the histories of the four cases on which I have operated. The whole or the greater part of the clot thus artificially induced would not at first be other than healthy in character, but it might subsequently become infected with micro-organisms, in which event it would be easy to wash it out, especially if the lower end of the upper segment of the vein had been stitched to the margin of the skin wound in the neck. By these means the surgeon may erect an effectual barrier against further pyemic infection from the primary focus, which may at once be successful in arresting the symptoms of danger, or may materially assist a patient in combating the symptoms of acute pyemia until the chronic stage is reached, which, in this disease, is always of hopeful import so far as life is concerned." In a paper written last year for Chipault's international work, "L'Etat Actuel de la Chirurgie Nerveuse," as yet unpublished, this position is modified by saying: "Nothing is more striking to those who have had much experience in these cases than the fact that in some the process rests purely local, while in others it rapidly extends in either direction. The pathological conditions being so diverse no absolute rule can be given as to whether or not the internal jugular vein should be tied. The course to be pursued depends upon the condition found. If the suppuration in the vein is localized and the sinus occluded on each side of the area of suppuration, incision of the sinus and drainage suffices for its cure. If, however, infected clot is extending along the course of the jugular vein it is as clearly the duty of the surgeon to operate on that vein as it was his duty to operate on the original disease in the temporal bone; he must, as we have already said, follow the disease to its utmost limits,"

That is to say, in other words, that if when you do the operation the conditions found are such as to make it quite sure that a pure block already exists in the highway you need not make a new one. The principle of the original statement is in no way modified by this concession, since nature has then already done what would otherwise be demanded from art. Körner in reference to this question says: "The cause of the happy result of operations limited to the sinus lies in the fact that the sinus is in most such cases shut off on both sides by solid uninfected thrombi. Again, most such cases are instances of early sinus-thrombosis unexpectedly found in operating for extra-dural abscess, not yet of great extent and but little broken down.....In most cases it cannot be known whether the thrombus has extended into the bulb of the jugular and there broken down, from this situation detachment of particles and their entrance into the blood-current can take place more easily than from the sinus. The ligature of the jugular is *justified* in all cases of sinus-thrombosis and will be *necessary* when the diseased sinus is not firmly occluded on the cardiac side. "The question is more simple if it is known that the thrombus has extended to the bulb of the jugular vein itself. Every movement of the head and every manipulation of the neck may cause detachment of particles of clot, and experience teaches us that under these conditions the occurrence of pulmonary metastases is almost constant. All authors agree that here the jugular should be tied and that before the sinus is opened."* "If a considerable flow of ichorous fluid takes place on incision of the sinus," says Jansen,† "it is to be inferred that the septic breaking down process extends to the bulb, and that the bulb, if not already infected, is in immediate danger of becoming so. Under such circumstances the surgeon had best proceed forthwith to the ligature of the jugular." It is impossible, in many a case, to say that there is no reason to fear septic venous infection, and in case of doubt operation on the jugular should be performed.

"To fear the worst is oft to cure the worst."‡

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*Körner, op. cit., p. 80.

†Jansen, loc. cit., p. 27.

‡Troilus and Cressida, Act III, Scene 2.

Conclusions.

1. *Diagnosis of case before or during operation.* — The surgeon, from his examination of the case, must, if possible, come to a clear determination as to the condition from which his patient is suffering—whether (*a*) from an acute systemic infection or (*b*) from a systemic disturbance depending upon a local process. When this can be determined beforehand the plan of operation is clear. If doubt exists as to the exact nature of the case the matter must be cleared up by careful observation at as early a period as possible during the progress of the operation on the temporal bone.

2. *The operation on the vein.*—This should be undertaken (*a*) in acute pyemia and acute septicemia, whether the sinus is occupied by clot or by fluid blood; (*b*) if the sinus wall is gangrenous or its contents are putrefying, unless it is perfectly clear that on both sides of the area of inflammation the lumen of the sinus is completedly blocked by non-infected thrombi (how seldom this qualification will be operative will be obvious to those who have most experience of these cases); (*c*) if it is proved, or even suspected, that the blood of the jugular bulb is in part or wholly clotted; and (*d*) if the jugular vein is thrombosed.

It will be seen that, in my opinion, operation on the vein is called for, not only by general systematic infection, but also by certain local conditions. Some observers hold the opinion that the decision of the question as to whether operation on the vein should be carried through depends principally upon the local condition found, while others think that the decision should depend more upon the state of the patient in general and the febrile condition in particular. The right course to adopt is clearly to give due consideration to all the facts.

When it has been decided to deal with the vein before begining to operate, the operation on the vein should precede that on the temporal bone, and when operation on the vein is first decided upon during the course of the temporal bone operation, it should be forthwith carried through without waiting for the completion of the operation on the sinus region.

The vein when not thrombosed is exposed in the neck about the level of the cricoid cartilage, and the surgeon tying its tributaries and dividing them between two ligatures, should remove it completely up to the bulb. Ablation of the vein is better than ligature. It involves ligature of the tributary veins and as the line of incision involves the external jugular that vessel is also necessarily tied. In cases of thrombosis of the internal jugular the ablation will begin at its junction with the subclavian, and it will be no difficult task in these circumstances to find on its inner side, lying on the scalenus anticus, the vertebral vein and to ligate and divide it also.

Lest it may be said that this is too desperate a measure to recommend I would say that in these cases.

"Strong reasons make strong actions,"*

and

"The only safety lies in the despair of safety."†

3. *The completion of the operation on the sinus region.*—Having dealt with the vein the operator returns to the sinus region and removes bone so as to expose the sinus toward the torcular for a distance of at least three-quarters of an inch beyond the area of inflammatory change, and the same treatment is adopted on the other side of the inflamed area, bone being removed in some cases, and probably better in all, as far as the bulb, so that the whole area of possible infection of sinus and vein is exposed in one continous wound.

In general surgery an extensive septic suppuration is treated by laying the affected area open by one or several incisions, but in those cases in which it is possible to expose the infected tissues by one incision, however long, the best results ensue. If one continuous wound is not made in cases of lateral sinus pyemia the dangerous area of the bulb is not laid open and the presence here of even small particles of putrefying clot may determine an extension of the infective clot along the inferior petrosal sinus to the cavernous sinus, just as when a ligature has been left on the upper segment of the

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***King John, Act III., Scene 4.**

†Conquest of Mexico, Prescott, Vol. I., p. 351, also, "una illis spes salutis, desperasse de saluti.," P. Martyr de Orbe Nove, Dec. 1st, cap. 1.

jugular a "test-tube of pus" may form in it and produce a similar disastrous effect. The danger of this practice was pointed out in a previous paper.*

Jansen† says that when he has reason to anticipate further suppuration in the sinus thrombus he exposes the sinus for a greater length so as to be able to extend his incision in it without the necessity for a further bone operation. This seems, however, a recommendation which is not sufficiently thoroughgoing, since if further breaking down of the thrombus is likely to happen further incision of sinus is required at the first operation. It is impossible to deal with the sinus as with the the vein, by removal, as this would expose the intra dural space. In acute foul suppuration of other parts of the body we do not curette away the pus and therefore the suggestion frequently found in otological literature, that we should curette away pus or putrefying clot through an opening in the sinus, is one that should be abolished from surgery. The obvious proceeding is to slit up the sinus, if necessary from torcular to bulb, so that the whole area of infective inflammation may be exposed and dressed *secundum artem*.

Brieger‡ says: "No doubt remains as to the measures to be carried out with respect to the sinus. The sinus is to be slit up in the whole extent to which it is thrombosed and the tube of the vessel is to be converted into a groove, freely exposed on its outer aspect by the excision of the entire outer wall, and its contents for this portion of its extent completely removed. The sharp spoon is not a permissible instrument for use in the sinus because, even when immediate injury is avoided, clots may be detached which are serving to shut off from the infected area neighbouring vessels, such as the petrosal sinuses, which are as yet intact. The occurrence of hemorrhage when clearing out the sinus is not, *per se*, a proof that the removal of clot is complete. By the removal of such portions of clot as block the entrance of the petrosal sinuses sharp bleeding may occur in spite of the lateral sinus or the jugular being full of clot."

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*Ballance: Allbut's System of Medicine, loc. cit., p. 603.

†Jansen: Encyclopaedie der Ohrenheilkunde, loc. cit., p. 371.

‡Brieger, loc. cit., p. 94.

4, *Some further considerations.*—1. The radical procedure here described will, in certain cases, no doubt commend itself to all, but, as I have already pointed out, it is in the selection of cases that the judgment of the surgeon must come in. Want of proper perspective in the selection of the operation suitable to a particular case is well illustrated by the following instance: "The two practitioners in attendance had already chiselled away the mastoid a few days after the commencement of the pains in the ear, and that as far as the posterior border of its apex, for they had mistaken the posterior border of the mastoid for the linea temporalis. As they had found no pus and as the violent pain persisted and the fever was still higher after the operation in their perplexity they sought my help. I incised a boil which completely occluded the meatus, whereupon fever and pain immediately ceased. The unnecessary wound in the mastoid healed in three weeks."* No one would use such a case as an argument against complete removal of all disease in the temporal bone; and no one I trust, would select the operation I have just described on the sinus and vein for the relief of a local process in the temporal bone. In dealing with a case our measures must correspond to the actual condition from which the patient is suffering.

.2. It has already been shown that the surgical treatment should be the same whether the disease has had its origin in an acute or in a chronic inflammation and that the dealing with the inflamed sinus and the inflamed vein in a manner comparable to the proper surgical treatment of acute inflammation in other parts of the body by free incision or ablation is not only not dangerous but highly beneficial and curative.

3. In all great operations, speed is an essential factor. In such an operation as I have described rapidity of skilled execution is as urgently needed as in general septic peritonitis from perforation or as in hemorrhage from rupture of the spleen or the rupture of a tubal pregnancy. As germane to the subject of despatch in operating I may quote from a writer who in criticising an operation which had been needlessly prolonged says: "Such slowness is no result of justi-

*Koerner: Die Eitrigen Erkrankungen des Schlaefenbeins, p.50.

fiable caution but shows want of dexterity and imperfect knowledge of the operation region and the want of self-confidence arising therefrom."*

To sum up, may I again emphasise the fact that I am profoundly convinced of the value of arresting the current of venous blood which flows from the infected area. I strongly urge its curative value, its imitation of the processes of nature, its harmlessness as an operative procedure, and its foundation on a true appreciation and knowledge of pathology. It does not appear to me to be a moot question of surgical detail but is in accord with fundamental surgical practice. The risk in leaving the vein unoccluded must not be run.

Chronic Suppuration in the Middle Ear; Thrombosis of the Lateral Sinus; General Septic Infection; Operation; Venous Transfusion; Recovery.†

W. M. WILLIS. (*Lancet*, June 14, 1903.) Chronic suppuration in the middle ear is an extremely common disease and in view of the serious complications which sometimes ensue in consequence of its persistence it is well deserving of consideration and adequate treatment. However the inflammation originates, its persistence is to be found in the fact that inefficient drainage exists and this arises from several causes. There is an anatomical cause, which is a bar to efficient drainage in the case of suppuration within the tympanic cavity, inasmuch as that portion known as the attic is a sort of natural reservoir the floor of which is on a higher level than that of the floor of the general cavity of the tympanum and discharge from this portion will only occur by overflow. It is common for the inflammatory process to involve the mastoid and here we have isolated cells which communicate with the general tympanic cavity through the largest of them known as the antrum. But the communication of the antrum with the tympanum is reduced in disease, so that efficient drainage is easily impaired. Thus from these causes we have

*Koerner: Op. cit. p. 18.

†A paper read before the Nottingham Medico-Chirurgical Society on Jan. 21st, 1903.

a collection, varying slightly in amount from time to time, but always more or less existing, of what may be termed residual pus and this is present under a certain amount of pressure or tension.

In addition to the foregoing there is a pathological reason why efficient discharge is prevented and this is to be found in the presence of granulation tissue which is present in varying quantity both within the tympanum and on the outer side of the perforation in the tympanic membrane, through which the pent-up matter originally made its escape and from which it has continued to issue. Two facts have so often presented themselves to me that I believe them to be true. The first is that the disease in question is eminently curable if free drainage is established and maintained, and the second is that by reason of the long time some of these cases are allowed to persist either they must be looked upon with apathy or indifference or inadequately treated. If the bar to efficicient drainage found in the granulations before alluded to be removed by treatment directed through the meatus, and the aperture in the tympanic membrane be enlarged, and subsequently the tympanum be kept surgically clean, the patients in many of these cases will quickly get quite well. Some, however, will not and more extensive measures will be required. For these, when the less severe methods have been thoroughly tried and failed, the operation of opening the mastoid antrum or that known as complete mastoidectomy will need to be be performed. This can be urged with much confidence as a cure can be promised and the mortality *per se* may be disregarded.

Cases will have to be decided upon on their own merits. In some an operation on the lines of that originally devised by Schwartze will be adequate but in others the more extensive proceedings practised and described by Stacke will be needed. In either operation it is necessary to have an accurate knowledge of the anatomic structure of the parts and to exercize an abundant care in the steps of the operations, but provided these conditions can be compled with then the operations are reasonable safe and will afford good results. There will be careful and patient subsequent treatment necessary oftimes, but in the end a cure will be effected.

These preliminary observations on chronic suppuration in the middle ear serve as a preface to the description of a case recently under my care, in which prolonged suppuration was followed by thrombosis of the lateral sinus, extending into the jugular vein, and subsequently by general septic infection as evidenced by signs of inflammation in the lung and effusion of fluid into the pleural cavity and repeated rigors.

The patient, a male, aged 19 years, was admitted into the Nottingham General Hospital on Oct. 11th, 1902. He complained of pain in the head and gave the following history. There had been a discharge of matter from the right ear for nine years, it having followed an attack of scarlet fever. One week before admission he was seized with sudden illness and suffered from shiverings, vomiting, and intense pain in the head. Coincidently, he stated, the discharge from the ear ceased. His condition on admission was as follows: The temperature was 102·8° F. He had pain in the head, especially on the right side, stiffness and tenernessd of the muscles of the back of the neck, and some retraction of the head. There was an indistinct fulness to be felt in tne neck high up just below the mastoid process. He was under the care of Mr. Joseph Thompson at this time who in view of the patient describing himself as feeling better, and as the temperature was falling, and there being no urgent symptoms, decided to watch the case for a time. His condition remained much as above described until Oct. 18th, when, for the first time since admission, he had a rigor which lasted for 20 minutes and the temperature rose to 105·2°.

On Oct. 19th Mr. Thompson, being unable to attend, asked me to see the patient and I then learnt the fact of the rigor on the evening of the 18th and found that during the time he had been in the hospital, whilst there had been no rigors other than that mentioned, yet there had been an extremely oscillating temperature.

In addition to the temperature there were present headache, purulent discharge from the right ear, tenderness and stiffness of the muscles of the back of the neck, and a fullness down the upper half of the anterior border on the right side. There was no optic neuritis.

I formed the opinion that he had a thrombosed lateral sinus and operated on the same morning. I first turned down a semilunar flap about two inches in diameter, one side of the incision falling just behind the pinna and the other nearer the occipital protuberance. Baring the bone and drawing the pinna well forward I defined the bony margin of the external auditory meatus. I then opened the mastoid antrum and cleared out a small quantity of inspissated pus which it contained. The next step consisted of trephining over the laternal sinus, exposing it by the removal of a half-inch disc of bone. An incision into the sinus revealed the fact that it was full of clot. Leaving the skull I now turned to the neck and exposed the laternal jugular vein and found that the thrombus extended low down into this. I therefore ligatured it as low down as possible but could not get below the clot, and excised some one and a half inches of the vein above the ligature. Returning to the skull I slit open the sinus and removed the clot and syringed through with sterilized water from the sinus to the jugular vein exposed in the neck, washing out thereby all the contained clot. Bleeding now became free both from the sinus and the jugular vein. The latter was therefore ligatured and the former was plugged with gauze, the hemorrhage being thus easily controlled. The skull flap was then stitched into position, gauze plugs being in the sinus and in the mastoid antrum, the ends of those issuing from the respective angles of the wound. The wound in the neck was then closed, and here I may say that this was a mistake, as it suppurated later and had to be completely undone; no harm, however, ensued.

By this complete operation I succeeded in removing nearly the whole of the septic clot, and in addition cut off the main supply of septic material from entering the general circulation. I therefore looked for a cessation of the symptoms which had previously existed and hoped for an uninterrupted recovery. But in this I was disappointed. The operation was performed on Oct. 19th and without giving the detailed notes taken from day to day suffice it to say that his symptoms continued. He had repeated rigors and high temperatures. In the intervals of the rigors he felt fairly well but extremely weak.

On Oct. 25th my note says: "Breathing seems a little labored; crepitations to be heard at the third left rib in front and impaired resonance at the left base." The physical signs remained thus for the next day or two and the rigors were repeated. I therefore resolved to adopt a method which I have not seen described as having been employed for the treatment of undoubted general septic infection.

I think there can be no doubt that it was a case of true septic infection as distinct from septic intoxication—i. e., septicemia as against sapremia—this view being supported by the fact that the main part, if not the entire supply of septic material had been cut off, in spite of which the constitutional symptoms persisted and the condition in the lungs above described supervened. His only hope of recovery I considered lay in an increase in his power of eliminating the poison with which he was saturated, and this I thought I could effect for him by large y diluting his blood. On Oct. 30th I therefore admitted into his right median basilic vein three pints of normal saline solution and one ounce of brandy. On Nov. 2nd my note says: "Has had no rigor for several days and there has certainly been an improvement in his condition ever since the transfusion."

"There are some dulness at the left base and a diminution of breath sounds and vocal resonance." On the 3rd I opened the median basilic vein of the left arm and removed nearly one pint of blood; I then transfused him with another three pints of normal saline solution and one ounce brandy. On the 10th my note states: "He has improved immensely since the last transfusion. For the last three days his temperature has been practically normal."

On the 3rd the second transfusion took place and the temperature did not finally reach normal until the 7th, but in the intervening four days it was lower on the average and the elevations were not so great when they did occur. The chart for these days suggests a final flicker of the disease. The quantity of urine excreted subsequently to the transfusions did not show any great increase, though it was a little more, but there was marked sweating, his garments being frequently changed when wet through. It was in this way, possibly, that he eliminated toxic elements.

His final recovery was now uninterrupted and he is at the present time perfectly well and was shown at a meeting of the Nottingham Medico-Chirurgical Society on Jan. 21st, when this account of the case was read.

In conc usion, I would say that this short paper does not presume to be an elaborate account of the treatment of chronic suppuration in the middle ear, but merely expresses the opinion that that disease is eminently curable, and in view of its complications, should be cured. Secondly, in a brief and imperfect manner the lines on which such treatment should be carried out are suggested and outlined. Finally, in respect of the thrombosed lateral sinus, the operation described is in no way novel, but is the method very frequently adopted. In regard to the history of the case, however, subsequent to the operation, the evidence which the case affords seems to me to warrant the opinion that the patient's life was saved, when he would otherwise have died from septicemia, by the transfusions which were performed, and I venture to submit this for publication as I have not seen a similar case recorded.

II.—NOSE AND NASO-PHARYNX.

Chronic Sphenoidal Suppuration.

McKeown. (*Lancet*, Aug. 2, 1902.) Some observations as to treatment.

Rodent Ulcer of Nose and Eyelids.

Taylor. (*Lancet*, May 17, 1902.) Report of a case satisfactorily treated by x-rays.

Nasal Vertigo Simulating Epilepsy.

Woakes, (*Lancet*, Aug. 16, 1902.) A man aged 60, suffered with "epileptiform seizures," which were relieved by removal of left middle turbinal body which was in close contact with septum. Later on (4 years) symptoms returned, and both middle turbinals were removed, with relief.

Use of the Naso-Pharyngeal Tube for Prolonged Nitrous Oxide Anesthesia.

HILLIARD. (*Lancet*, June 28, 1902, and May, 1895.) The author maintains that it is a successful method of prolonging gas anesthesia in mouth operations.

The Uses of Suprarenal Extract in Nose and Throat Diseases.

B. DOUGLASS. (*N. Y. Med. Journal*, May 2, 1903.) The author reviews in a general way the uses of suprarenal extract, giving largely the results of his own experience.

Next to adrenalin chlorid he prefers for use in the nose and throat a 6 per cent. solution of the gland in freshly boiled water. He believes that all antiseptics used in the solution tend to weaken its activity. He mixes his adrenalin with cocain for local use, using 20 minims of the former, 1-1000, in a half ounce of 4 per cent. of cocain, or 1-500 of the adrenalin to a 7 per cent. solution of cocain for work on the septum.

Douglass no longer believes the hemorrhages which follow its use are due to its secondary effects. He has, however, met such cases, and so, after any nasal operation, introduces strings of iodiform gauze or Bernays' sponges. For septal work he introduces hypodermically a solution of 30 grains of suprarenal to 1 ounce of water, with 10 grains of sodium chlorid and 5 grains of eucain added after filtration, and 5 grains of cocain just at time of use. This makes a 1 per cent. solution of cocain—6 minims are usually sufficient. Certain unpleasant results are noted—among them dryness of throat and nose, change in character of nasal secretions, sense of shrinking of nasal membrane, tickling, headache, etc. He is of the opinion its use delays healing. Of the uses noted emphasis is laid on its value in acute inflammatory disorders, and also as a temporary help in malignant disease of the nose. *Harris.*

On the Duplicity of the Accessory Sinuses of the Nose.

BRUEHL, Berlin. (*Archives of Otology*, Vol. XXXII, No. 2.) Two cavities instead of one are frequently encountered in the frontal sinus, in the sphenoidal sinus and more

rarely in the maxillary antrum. Anatomical investigation has shown that in most cases this is due to ethmoidal cells which have extended to the frontal bone, the sphenoid bone and the superior maxilla. In the maxilla dentigerous cysts occasionally produce the additional cavities.

A true duplication of the accessory sinus due to a division of the rudimentary condition is extremely rare.

Campbell.

Osteomyelitis of the Skull With Empyema of the Nasal Accessory Cavities, Sinus Thrombosis; Pyemia; Death; Autopsy.

ARNOLD KNAPP, New York. (*Archives of Otology*, Vol. XXXII, No. 3.) A woman aged 21 had for 5 years nasal occlusion and purulent discharge. The nose slowly broadened out, producing the typical frog face. Polypi filled the upper nasal cavities, but examination of these and adjacent bone showed only ordinary inflammatory changes. Antisyphilitic treatment was ineffectual. The inner orbital walls were removed, the frontal sinuses were opened, but a low-grade osteomyelitis spread upward and backward over the frontal eminences to the coronal suture and into the temporal fossae.

The temperature now rose abruptly, the right sub-occipital area became indurated. Involvement of the sigmoid sinus was suspected, and on exploration an epidural abscess was found situated over the upper knee of the sigmoid sinus. The sinus was filled with a thrombus and was completely evacuated. Pyemic infection developed in the lungs. Optic neuritis with hemorrhages was present and the patient died rather suddenly.

On autopsy the inner surface of the left frontal bone was honey-combed, and the underlying dura was covered with small granulations. The ventricles were filled with a turbid fluid and the torcular contained a purulent thrombus. Thrombi were present in the bulb and jugular vein. The sphenoidal and maxillary sinuses contained pus.

Campbell.

A Case of Rapid Destruction of the Nasal Septum, Probably Lupus, in a Male aged Thirty-four.

DR. WYATT WINGRAVE. (*Journal of Laryngol.*, July,

1903. *Laryngological Soc. of London.*) The patient, a well-nourished male, a plumber, complained of a sore nose of six months' duration. It commenced as a sore spot just inside the nostril, which soon became a hole, and, melting away like glue, ate its way to the lip. He was in the habit of picking it freely and pulling out hairs. There was now complete loss of septum from before backward, as far as the posterior limit of the vestibule, with nodular ulceration of the upper lip on the site of the philtrum, more or less covered with crusts. He gave no history of syphilis or tubercle. The gums were healthy, but he had some copper-colored spots on the forehead. He had been married twelve years and had four healthy children. His wife had no miscarriages. There was a submental enlarged gland.

Dr. Grant said that the columella of the nose was eaten away entirely by a curious circumscribed ulcer. Had any member seen a similar case? It was very difficult to decide whether it was a case of primary syphilis, or of tuberculosis, or of epithelioma.

New Method of Treating Epistaxis.

HUNTER MACKENZIE. (*Brit. Med. Jour.*, Sept. 1902.) Male, aged 49, bled freely from a point on the anterior third of the nasal septum. Galvano cautery, cocain, adrenalin and other measures failing to stop the flow after three days, the mucous membrane of the septum corresponding to the source of bleeding was snipped off by means of a nasal spoon and curette. This proved effective. The author deprecates plugging of post nares.

III.—MOUTH AND PHARYNX.

The Therapeutics of the Pine Apple.

WYATT WINGRAVE. (*Lancet*, June 23, 1903.) Draws attention to the powerful proteolytic action of its ferment, its application in keratosis of tonsils, diphtheria, etc.

The Influence of Nasal Obstructions Upon the Development of the Teeth and Palate.

WYATT WINGRAVE. (*Brit. Med. Jour.*, Aug. 16, 1902.)

The view that an obstruction directly influences the development of the teeth, and is the cause of gothic arched palate is not accepted by the writer. He suggests that this interpretation is to be found in a premature ossification of the interpalatal, inter-maxillary and vomerine sutures, so that the ethmo-vomerine element—the septum—becomes crowded and distorted in the absence of sufficient vertical room for its development.

The result is a high vault to the hard palate, small, undeveloped maxillary sinuses and small nostrils, red with the inevitable mouth breathing.

The Diagnosis and Treatment of Malignant Stricture of the Esophagus.

SYMONDS. (*Pol. Lar. Soc. of Lon.*, July, 1902, Vol. IX.) Classified according to situation. Treatment was summarized:

1. Cricoid—Long rubber tube or gastrotomy early.
2. Central.—Short tube.
3. Cardiac Orifice.—Gastrostomy.

Chronic Hypertrophy of the Faucial and Pharyngeal Symphoid Tissues.

MARSH. (*Lancet*, June 21, 1903.) A historical and surgical survey.

Death After the Removal of Tonsils and Adenoids in Hemophilic Child.

STEWART. (*Lancet*, Nov. 15, 1902.) Boy aet. 7 years had tonsils and adenoid removed under ether. Hemorrhage free at the time but stopped. Two hours later blood extravasation rapidly took place into both sides of neck and subcutanously without bleeding into mouth or naso pharynx. Intubation, traecheotomy and death resulted thirty-two hours after operation.

Necropsy showed no large thymus. There was no history of hemophilia.

Arrest of Hemorrhage From the Tonsils by Suture of the Faucial Pillars.

LAMB. (Short article in *Brit. Med. Jour.*, Nov. 15, 1902.,

quoting Escort.) The hemorrhage was very severe after removing tonsils in "un morcellement." The pillars were drawn together by two sutures passed by a staphylorraphy needle holder, a cylindrical tampon of cotton wool being included between them.

(As bleeding rarely occurs from the tonsils stump, but from the anterior pillars, Baum's method is of great service. —Abstractor.) *Wyatt Wingrave.*

Functions of the Epiglottis.

RENSHAW. (*Brit. Med. Jour.*, July, 1902.) Concludes that it has no important action in deglutition, beyond that of a slight lateral protection of the glottis. That its main function is to prevent the secretions of the upper air passages from entering the larynx when in a state of rest. That its influence over phonation is at present undetermined.

Wyatt Wingrave.

Primary Gangrene of the Tonsils.

ROBT. FULLERTON. (*Lancet*, June 7, 1902.) Relates 2 cases of slough occurring in tonsils following acute lacunar tonsillitis. They differed from the "acute ulcerative tonsillitis' of Moure in the presence of constitutional phenomena surrounding infiltration and the micro-organisms present were staphylococci, diplococci and later pneumococci.

One of the patients died nine months later of acute tuberculosis. *Wyatt Wingrave.*

IV.—LARYNX.

Bilateral Adductor Paralysis in a Boy Aged Seven Years.

WINGRAVE. (*Lancet*, July 26, 1902.) Case shown at Brit. Lar. and Rhin. Assoc. Aphonia had persisted for four years; there were no adenoids, and voice was permanently restored with one application of the interrupted current. It was regarded as hysterical.

Congenital Papillomata of the Larynx in a Female Aged Twenty-Three.

GRANT. (*Lancet*, July 26, 1902.) Case shown at the Brit.

Lar. Rhin. Assoc. The patient had worn tracheotomy tubes since infancy, growths removed with forceps and snare. Tracheal wound closed, complete recovery of voice.

Functions of the Epiglottis.

CLINCH. (*Brit. Med. Jour.*, Aug. 2, 1902), Reference to its position in young marsupials.

RENSHAW (*Brit. Med. Jour.*, July, 1902) concludes that the main function is to prevent the secretions of the upper air passages from entering the larynx when in a state of rest. That during deglutition it acts as a slight lateral protection to the glottis.

The Operative Treatment of Stenosis of the Larynx Following Intubation and Tracheotomy. Report and Exhibition of the Cases.

ARTHUR B. DUEL. (*N. Y. Med. Jour.*, May 2, 1903.) A valuable contribution to a difficult field of surgery. "One per cent. of cases intubated for acute stenosis are found to require continued intubation or tracheotomy thereafter."

"The cause of the retention is due in the majority of cases to chronic inflammation of the interlaryngeal mucous membrane and hypertrophy of the subglottic tissues and not as has been generally supposed, the result of granulation ulceration on cicatricial bands "

"Auto-extubation is the rule and adds greatly to the danger. As a result a large number of such cases are tracheotomized for safety, where high tracheotomies are done cicatricial bands are almost certain to form in the trachea or lower part of the larynx above the tracheotomy wound."

Duel advises in the treatment to introduce the largest size tube possible under an anesthetic. This tube should be specially constructed, the construction below the neck being only 1/32 of an inch smaller than the retaining swell. This tube should be left undisturbed for at least six weeks. He believes that where auto-extubation frequently occurs, it is better to split the larynx and retain the tube by a clamp, rather than resort to a tracheotomy. Where it is impossible to dilate the larynx, it will be necessary to perform a thyrectomy as in the three cases reported, and the special tube then introduced. *Harris.*

The Treatment of Early Cancer of the Larynx by Thyrotomy.

EUGENE S. YONGE. (*Lancet*, Nov. 15, 1902.) If it were desired to apply Emerson's doctrine of "compensation" to the condition of cancer as it affects the larynx—granting that any indemnity can be conceived for so serious an affection—one might perhaps discover an application of it in the favorable position—from an operative point of view—which malignant disease generally occupies in that organ and in its usual course and progress there. In the majority of instances epithelioma (which is the form of malignant disease to which I more particularly refer) is at first *intrinsic*—that is it takes origin from a vocal cord or ventricular band and is confined, often for a considerable period, within the laryngeal cavity, where its possibilities for evil are for the time limited and in a sense parochial. The larynx during this period regards the new growth with considerable tolerance, and the growth it self acting, as it were, on the principle *volenti non fit injuria*, betrays a great reluctance to invade and to penetrate the cartilage of the structure and spreads by preference upwards toward the superior aperture, thus eventually becoming *extrinsic*, or downward toward the trachea. Moreover, commonly, but not universally, involvement of the lymphatic glands is absent or very late in making its appearance; and so long as the disease remains intrinsic the lymphatic glands do not as a rule receive their quota of infected material. The reason of this peculiar exclusiveness of the intrinsic growths is still matter for conjecture; but whatever the cause may be, whatever factors may coöperate to produce the so-called "isolation" of the larynx, the clinical fact is well known that intra-mural neoplasms are thereby rendered more amenable to successful surgical interferance than they would otherwise be. The importance of recognizing the disease at this early stage, when the mischief is still purely local, is of course very great. It is at this time that the comparatively simple procedure of thyrotomy with excision of the diseased structure (including, if necessary, cartilage) is capable of application and is likely to be followed, as pointed out by Semon,* Butlin, Chiari, Schmiegelow, Tilley, and others, by

*Sir Felix Semon has recently informed me that the proportion of cures which he has obtained by thyrotomy in these cases is now nearly 90 per cent. Also vide The Lancet, August 11th, 1900, p. 393

such brilliant results, And these results are not confined to the radical extirpation of the disease and the prevention of its recurrence, but extend in many instances to a marked restitution of the vocal powers. Furthermore the risks and disadvantages associated with total or partial laryngectomy are to a large extent avoided. I mention immediately below two cases of epithelioma upon which I operated by this method more than a year ago and which are still free from any sign of recurrence.

CASE 1.—A man, aged 57 years, consulted me for hoarseness of about 12 months' duration. On laryngoscopic examination the left cord was found to have been transformed into a papillary fringe; it moved less freely than the corresponding cord which was hyperemic but otherwise appeared normal. No enlarged cervical glands could be felt. A portion of the growth was removed with Schrötter's tube forceps and pronounced, after microscopic examination, to be squamous epithelioma. On July 29th, 1901, I performed tracheotomy, cutting through the isthmus of the thyroid gland and inserting the tube in the trachea between the two halves of the isthmus. On August 6th the larynx was opened by splitting the thyroid cartilage in the middle line. A sponge was inserted above the tracheotomy tube, which was an ordinary one of large size, and cocain was then applied to the interior of the larynx on the affected side in order to limit the hemorrhage and to enable the extent of the disease to be as far as possible defined. The left cord was excised together with a portion of the left ventricular band and arytenoid cartilage. The cartilage and soft parts in this area were thoroughly scraped and, after drying, were painted with iodoform varnish and the larynx and the external wound were closed. The tracheotomy tube was removed in 24 hours. The patient was aphonic for a few weeks after the operation but gradually developed a strong and fairly clear voice, owing principally to the formation of a fibrous band in the position of the vocal cord which acted vicariously for that structure. His voice is now much better than it was before the operation, in spite of the structures removed. At the request of his family he has attempted to sing, but I understand that the result of the effort was not melodious. At the present date, one year and

three months after the operation, there is no sign of recurrence.

Dr. S. Delepine, profesor of pathology at the Owens College, Manchester, has kindly made a very complete examination of the structures removed and his report is subjoined: "The tumor is a typical lobulated epithelioma. The section shows that the stratified squamous epithelium normally lining the true vocal cord has grown in the form of lobulated branched processes which have almost entirely replaced the connective tissue between the epithelium and the subjacent cartilage and thyro-arytenoid muscle. These lobulated projections form an almost continuous stratum of epithelium which at places is not less than 30 times the thickness of the normal epithelium. The deepest cell nests are in contact with the perichondrium of the vocal process of the arytenoid cartilage; they have also reached the inner portions of the thyro-arytenoid muscle which is partly atrophied and replaced by fibrous tissue. It is impossible to find any distinct tract of elastic fibre scorresponding to the edge of the thyro-arytenoid ligament. The tumor has undoubtedly invaded structures subjacent to the epithelium and has all the characters of a malignant epithelioma."

Case 2.—A man, aged 67 years, was sent to me for hoarseness which was said to have lasted about 18 months and which had resisted all treatment. There was a wartlike growth with a broad base which was attached to the right vocal cord and ventricular band. The right cord was almost fixed; the left cord showed evidences of congestion in its anterior half but otherwise appeared to be normal. Tracheotomy and thyrotomy were performed at the same operation on Sept. 2nd, 1901. The growth was somewhat more extensive than it had appeared to be on laryngoscopic examination, but the diseased structures were removed and the parts were scraped as in case 1. I employed a Hahn's tube in this instance and did not remove it until about six hours after the operation. For two days there were a considerable amount of coughing and some expectoration of blood, but after that the patient improved rapidly and made a good recovery. At the present time—one year and two months after the operation—he is in good health and remains

free from any sign of recurrence. The voice is not so strong as that of the previous patient, but is quite a satisfactory one.

Professor Delepine reports on this case as follows: "The characters of this tumor are very much the same as those of the above (Case 1). The thickening of the epithelial stratum is, however, less marked. The cell nests are smaller and separated by wider tracts of connective tissue. The cell-nests have, however, penetrated even deeper than in the previous case. The thyro-arytenoid muscle is more atrophied, the increase of interstitial tissue being considerable (interstitial chronic myositis). The cartilage is in a more advanced state of fibrous change (metaplasia), and although the growth seems to have been slower the evidences of malignancy in the tumor are even more evident than in the first case."

At the operations in both cases I had the advantage of the assistance of Mr. A. Wilson, senior anesthetist to the Manchester Royal Infirmary, and of Mr. F. H. Westmacott, aural surgeon to the Manchester Children's Hospital.

The most characteristic symptom of early malignant disease is, I think, undoubtedly a persistent dry hoarseness, especially if occurring in a person over 50 years of age. Pain on swallowing, glandular enlargement, bloodspitting, cachexia, and other symptoms indicative of the later stages of epithelioma of the larynx are generally to be regarded rather in the light of contra-indications to the operation under discussion. Hoarseness in laryngeal cases being only an effect, the discovery of the cause will in the majority of instances suggest a successful line of treatment. In malignant disease, on the other hand, the usual remedies are resisted and the intensity of the hoarseness is often found to be out of proportion to be physical signs which are to be observed by means of laryngoscopic examination. In such cases the removal of a piece of the suspected growth for microscopic examination may be advisable. It is, I believe, important that the piece removed should not be too minute but that the instrument should bite well into the tissues in order that the deeper structures may be capable of being examined. The appearances seen in the larynx are, in my experience, somewhat various. A distinct infiltrating growth may be present or a wart-like tumour be

the chief evidence of disease or the cord may be converted into a papillary fringe as in case 1. A suggestive and early sign, as pointed out by Semon, is a sluggishness in the movements of one or other cord not amounting to paralysis of the structure. The extension of a growth backward so as to implicate the arytenoid region is also a suspicious sign.

The radical nature of thyrotomy, carried out as described above seems, on the evidence of published records, to have been abundantly proved. In the comparative simplicity of the operation, in the small danger to life which it involves, and in the absence of liability to be followed by recurrence the procedure presents a decided contrast to some of the severe methods which in the past have too often been weighed in the balance and found wanting. Indeed in suitable cases the disadvantages of thyrotomy are so inconsiderable in proportion to the excellent results obtained that one is almost justified in saying of it, in the words of Schiller, "Kurz ist der Schmerz und ewig ist die Freude" (The pain is short —the joy is forever.)

V.—MISCELLANEOUS.

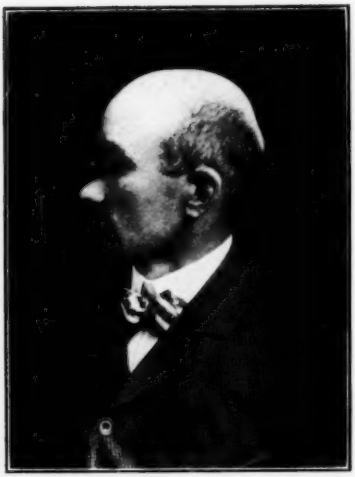
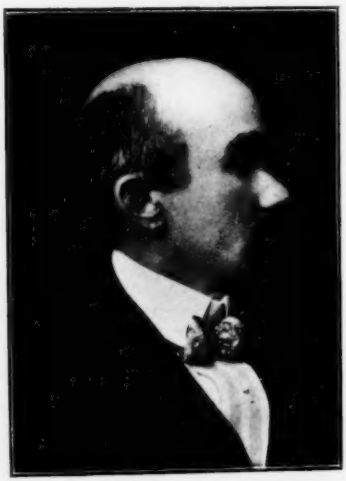
The Diagnosis and Treatment of Hereditary Syphilis.

E. H. GRIFFIN. (*N. Y. Med. Jour.*, March 14, 1903.) Hereditary syphilis is often overlooked or diagnosed as scrofula or tuberculosis. This is due to the false impression that Hutchinson's teeth are present in all cases. This is true in only 10-15 per cent. of the cases. Faulty examination of the buccal cavity is also responsible. All cases are curable by proper treatment. He does not remove dead bone in the nose at once, but allows it to remain "to serve as a shelf for new cells to form on." *Harris.*

A Critical Review of Some of the Recent Literature of Tuberculosis.

J. WRIGHT. (*N. Y. Med. Jour.* Feb. 21, 1903.) The author in his usual clear style passes in review the more im-

portant recent literature on this subject. He believes with Saenger that the tubercle bacilli cannot enter the alveoli of the lungs by the inspiratory air current. They reach the lungs "through the blood or by lymph vessels into which they enter either directly through the surface epithelium of the upper air tract or from lymph nodes and other foci of infection or lodgment." He regards the assertions of Koch essentially confirmed that the transmission of animal tuberculosis to man does not take place. The papers of Massie and Donelson on tracheal hemorrhage are commented on to emyhasize the latter's contention that many cases reported as cured tuberculosis, where the diagnosis was based on hemoptysis alone, were in fact cases of tracheal hemorrhage. In considering Veiss's paper on the curability of pharyngeal tuberculosis, Wright calls attention to the fact that pharyngeal involvement is extremely rare in the early stages of tuberculosis.

Remembering its vulnerable situation, whether we regard the mode of infection through the air or by means of the blood and lymphatics, the great rarity of involvement as compared with the larynx or lungs would forcibly suggest a peculiar form of local immunity. He agrees with Schmidt and Gleitsman that tubercular lesions are cured here more easily than elsewhere. This can be explained on account of the situation alone. At the same time the report of such cases as those of Veiss is not entirely conclusive, who reports four healed cases under use of tri-chlor-acetic acid, for the tubercle bacillus was not discovered in any, and only in one was a microscopic examination made.

The paper deserves to be read in extenso. *Harris.*